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Tests of Locomotives in Fast Passenger Service.

These tests were made from Jan. 1 to 16, 1895, by Mr. George T. Ladd, Jr., of the class of 1895, Cornell University, assisted by Mr. L. H. Turner, Superintendent of Motive Power; Mr. Robt. Gray, Traveling Engineer, and

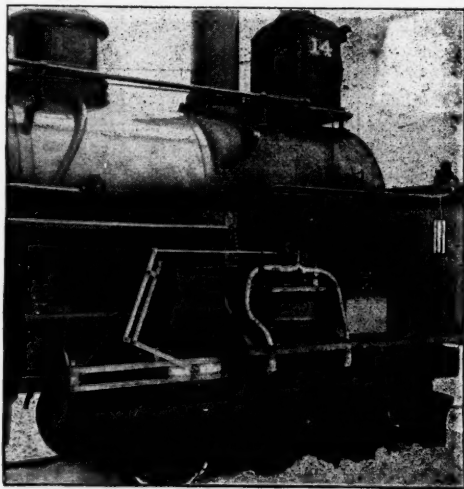


Fig. 1.

Mr. Fred Reese, Mechanical Draughtsman, all of the Pittsburgh & Lake Erie Railroad.

There were two engines tested, No. 14, 8-wheel, class 6 to 20, the boiler being built at the Chartiers shops and No. 97, 8-wheel, built by the Pittsburgh Locomotive Works. The following table gives the weights and principal dimensions of each:

Description.		
Type.	Engine No. 14.	Engine No. 97
Type.	8-wheel.	8-wheel.
Name or number.	No. 14.	No. 97.
Name of operating road.	P. & L. E. R. R.	P. & L. E. R. R.
Gage.	4 ft. 8 1/2 in.	4 ft. 8 1/2 in.
Simple or compound.	Simple.	Simple.
Weight on drivers.	31,000 lbs.	36,000 lbs.
" truck wheels.	32,000 lbs.	32,500 lbs.
" total.	63,000 lbs.	68,500.
General Dimensions.		
Wheel base, total, of engine.	22 ft. 4 1/2 in.	22 ft. 9 in.
Wheel base, driving.	12 ft. 4 in.	12 ft. 8 in.
" total (engine and tender).	44 ft. 4 in.	44 ft. 8 in.
Length over all, total, engine and tender.	53 ft. 10 in.	53 ft. 10 in.
Height of stack above rails.	13 ft. 8 in.	15 ft.
Heating surface, firebox.	125.5 sq. ft.	121 sq. ft.
" tubes.	150.0 sq. ft.	1,061 sq. ft.
" total.	1,275.5 sq. ft.	1,185 sq. ft.
Grate area.	17.20 sq. ft.	17.25 sq. ft.
Wheels and Journals.		
Drivers, number.	8.	8.
" diameter.	63 in.	68 in.
Truck wheels, diameter.	4-wheel, 28 in.	4-wheel, 33 in.
Journals, driving axle, size.	7 x 8 in.	7 x 9 in.
Journals, truck axle, size.	4 1/4 x 7 in.	5 x 9 in.
Cylinders.		
Cylinders, diameter.	17 in.	17 in.
Piston, stroke.	24 in.	24 in.
" rod, diameter.	3 in.	3 in.
Main rod, length center to center.	7 ft. 3 3/4 in.	7 ft. 3 3/4 in.
Steam ports, length.	15 in.	15 in.
" width.	1 1/4 in.	1 1/4 in.
Exhaust ports, length.	15 in.	15 in.
" width.	2 1/4 in.	2 1/4 in.

Valves.		
Valves, kind of.	Slide valve.	Richardson, balanced.
" greatest travel.	5 in.	5 in.
" outside lap.	3/4 in.	3/4 in.
" inside lap or clearance.	0 in.	1/2 in.
" lead in full gear.	3/4 in.	3/4 in.

Boiler.		
Boiler, type of.	Radial stay, reduced shell.	Radial stay, reduced shell.
" working steam pressure.	140 lbs.	160 lbs.
" material in barrel.	Steel.	Steel.
" thickness of material in barrel.	7/8 in.	7/8 in.
" diameter of barrel.	52 in.	52 in.
Thickness of tube sheets.	1/2 in. front and back.	1/2 in. front and back.
" of crown sheet.	3/4 in.	3/4 in.
Crown sheet stayed with.	1 in. radial stays.	1 in. radial stays.
D. me. diameter.	27 in.	27 in.
" height.	21 in.	30 in.

Tubes.		
Tubes, number.	200.	18.
" material.	Iron.	Iron.
" outside diameter.	2 in.	2 in.
" length over flange.	11 ft. 1 1/2 in.	11 ft. 2 in.

Firebox.		
Firebox, length.	5 ft. 10 1/2 in.	6 ft.
" width.	4 ft. 1 1/2 in.	2 ft. 1 1/2 in.
" depth.	Average, 73 1/2 in.	Average, 72 in.
" material.	Steel.	Steel.
" thickness of sheets.	5/8 in.	5/8 in.
" brick arch.	Yes.	Yes.
" water space.	Front, 3 1/2 in.; sides, 3 in.; back, 3 in.	Front, 3 1/2 in.; sides, 3 in.; back, 3 in.
Grate, kind of.	Cast iron rocking.	Cast iron rocking.

Other Parts.		
Exhaust nozzle, single or double.	Double.	Double.
Exhaust nozzle, diameter.	3 1/4 in.	3 1/4 in.
Stack, straight or taper.	Straight.	Straight.

Tender.		
Weight, empty.	30,203 lbs.	30,100 lbs.
" loaded.	67,700 lbs.	69,000 lbs.
Capacity of tank.	3,200 gallons.	3,000 gallons.
Diameter of wheels.	33 in.	33 in.

It will be seen that engine No. 97 has a little the greater weight, while No. 14 has a greater heating surface. The variation in other features is not great as is seen by a comparison of the tables.

The trains hauled during the tests were No. 17 northbound from Pittsburgh to Youngstown, a distance of 68 miles, with a schedule time of 1 hour and 40 minutes, making four stops; and No. 10, southbound over the same road, in 2 hours and 10 minutes, making 21 stops. The weight of the trains was:

Baggage and mail car.	46,240 lbs.
Two passenger coaches.	113,000 "
Wagner parlor car.	65,000 "
Total.	224,240 lbs.

In making the test the run was from Pittsburgh to Youngstown with No. 17 and back again on No. 10. The road was double tracked, with rock and cinder ballast. There were few sharp curves and a slight up-grade to Youngstown of 1.7 ft. per mile. Speed was cut down while crossing the Ohio River.

The object of the tests was to determine as nearly as possible for fixed conditions the point of maximum econ-

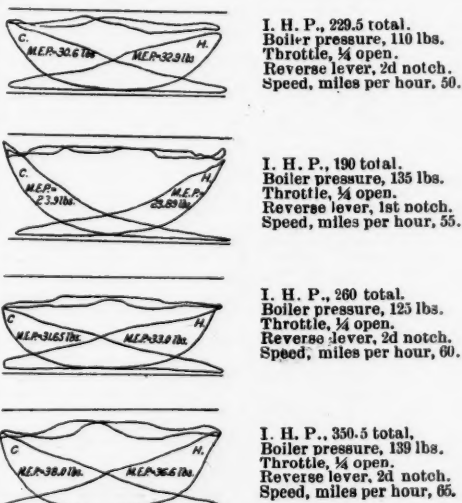


Fig. 3. Indicator Cards from Engine No. 14.

omy of operation. It was also desired to attain exactly the average conditions of operation, the power developed, the accuracy of valve setting, etc., of the two classes of engines.

Water.—The water was measured with a 2-inch Hersey meter set on the left side within the cab. It was on the running board close up to the boiler, and a check valve was placed between the meter and injector. It was also calibrated under the same conditions.

Fuel.—The fuel used was "run of mine" coal from the Berchmont mine, located on the Pittsburgh, Chartiers

and Youghiogheny Railroad. It contained 3.1 ash. The tank was filled with water up to a fixed point, the tender loaded with coal and then weighed. After the round trip the water in tank was brought to the same level, and the weight of the tender was taken again. The difference in weights was the coal used, allowance being made for that used while waiting at Youngstown.

The temperature of smokebox was taken with a pyro-

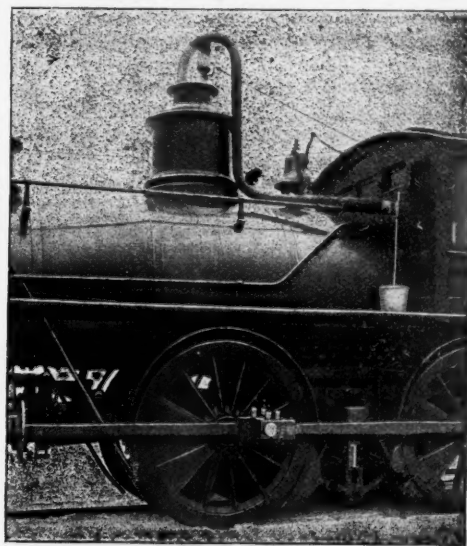


Fig. 2.

meter introduced midway between tube sheet and adjustable diaphragm.

The speed was taken by a Bayer speed recorder belted to front truck wheel.

In getting the smokebox vacuum a 1/2-in. pipe was tapped in smokebox on center line, and the bent-back in loop before attaching it to the U tube filled with mercury. The result of this was to give steadier readings of the gage. The indicator, speed recorder and vacuum connections are shown in Fig. 1.

The attachments for the calorimeter are shown in Fig. 2. They are somewhat different from those usually employed, and the calorimeter was put on in this way to avoid tapping into the side of the dome. A 1 1/2-in. pipe was tapped into the dome cap, and led by two easy bends to the cab window, where a 1/2-in. pipe extended through a bushing 10 in. back into it. In this 1/2-in. pipe were 1/4-in. perforations. To prevent condensation the 1 1/2-in. pipe was lagged with magnesia covering, wrapped and then coated with asphaltum.

Eight runs were made on engine No. 14, of which the first two were merely preliminary to get everything in good working order. In runs three and four the tracks were submerged in places, occasioning slow speeds and stops. Before runs seven and eight a new brick arch was put in.

Four runs were made on engine No. 97, and on run four the highest speed during the tests was attained, the speed being 73 miles per hour.

The comparison of the average results obtained during tests is as follows:

	Engine 14.	Engine 97.
Time on road.	2 hr. 2 min.	1 hr. 54 min.
Running time.	1 " 50 "	1 " 43 "
Number of cars.	4	4
Gross weight of train. Tons of		
2,000 lbs.	186.5	191.9
Average speed M. P. H.	38	40
Highest	65	73
Vacuum in smokebox in. of water.	6.94	7.21
Average indicated horse power.	476.95	551.35
Highest	768.05	979.30
Coal per hour, pounds.	1,793	2,496
" car mile, pounds.	13.4	17.4
" ton	.23	.36
" horse power per hour, pounds.	4.95	6.60
Coal per sq. ft. of grate per hour.	101.4	144.0
Coal per sq. ft. of heating surface per hour, pounds.	1.38	2.10
Water per hour, pounds.	17,500	10,600
" car mile, pounds.	70.80	67.00
" ton	1.50	1.33
" lb. of coal, actual, pounds.	5.35	3.85
Water per pound of coal, from and at 212 degs., pounds.	6.80	5.00
Water per horse power per hour, pounds.	26.6	25.4

Figs. 3 and 4 are indicator cards taken from these engines at high speeds. It is unfortunate that in all of them the throttle was only 1/4 open, the result of which was a failure to realize boiler pressure in the cylinders. The compression in cards from engine 97 is too high for good economy, and the back pressure too is excessive. It was found in this engine that the area of exhaust nozzles was less than exhaust port area by 2.17 in.

Figs. 5 and 6 show the average results graphically and are exceedingly useful for a ready comparison. The variation in run 3, Fig. 5, was caused by the exceedingly unfavorable condition of the track, it being partially submerged, as before mentioned.

Fig. 7 is the acceleration curves of the two engines and shows that No. 97 accelerates its train more quickly than No. 14. The former engine has a greater weight on drivers than the latter, and has also the largest driving wheels, which would account for this.

Fig. 8 shows the variation in mean effective pressures as the speed increases. It will be noticed that the mean effective pressures in engine No. 97 are higher than in engine No. 14. This may be partly accounted for by the fact that No. 97 has the larger driving wheels and therefore the piston speed is necessarily slower, giving the steam more time to enter.

Fig. 9 is the traction diagrams. These horse powers are obtained by taking the average of all horse powers

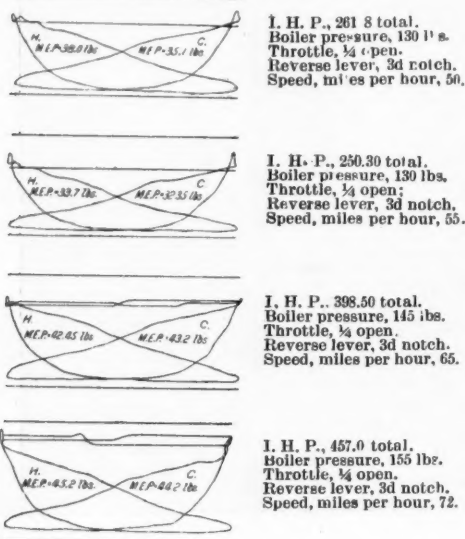


Fig. 4. Indicator Cards from Engine No. 97.

obtained for each fixed speed. The variation in these diagrams is not so much as in the previous ones.

Taking into consideration all the points, the result of the tests is somewhat in favor of engine No. 14.

A Combination of Grafton's Signal Blades and Carter's Signal Lights.

At the June meeting of the Engineers' Club of Philadelphia, Mr. George H. Paine read a paper on manual interlocking for switches and signals, giving an interesting statement of the philosophy of railroad signaling, and briefly sketching the principles of mechanical lock-

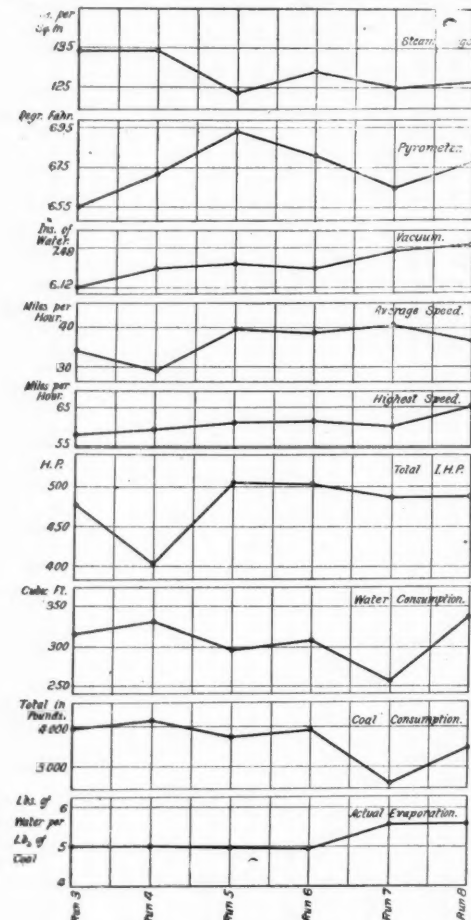


Fig. 5.—Engine No. 14.

ing. The paragraph devoted to distant signals and to certain other interesting features are reprinted here-with. One of these latter is a proposed combination of the day semaphore signal used on the Pennsylvania lines west of Pittsburgh with the night semaphore lights used on the Chicago & Northwestern. Mr. Paine showed drawings of this plan both for home and distant signals, and the latter we have reproduced. The construction of the Pennsylvania signal, with an arm hanging precisely vertical and at one side of the post, was first adopted, we suppose, chiefly for the purpose of getting a signal

which would be well adapted to showing three indications; Mr. Paine says nothing about the intermediate indication, though his scheme does not forbid the use of such whenever a third night color shall have come into favor. It will be observed that Mr. Paine advocates the use of two lights at the distant signal for the all-clear indication, in order to distinguish the signal from a home signal.

After disposing of home signals the author says: The distant signal is really nothing but the echo of a main line home signal; it can, strictly speaking, have no separate existence since it only announces to the engine-man the probable position of the home signal to which it relates. I say probable position because the distant signal may be in the caution position without regard to the position of its home signal, but it cannot be cleared until after the home signal has been cleared. The distant signal is open to one serious objection as at present used; although it tells the truth when the engine-man passes it in the clear position, there is usually nothing to prevent the signalman from inadvertently changing all of the combinations after the engine passes the distant signal, and before it reaches the home signal. This has often resulted disastrously and can only be prevented by placing an electric lock on either the home or distant signal lever which will automatically lock the route as soon as the train has passed the distant signal, if the distant signal has previously been cleared. When the conditions are understood it is evident that the electric lock should be engaged only when the distant signal is in its clear position. This arrangement is extensively used on the interlocking plants in New England, and it is to be regretted that a wider application of it is not insisted upon in other parts of the country.

Since the distant signal is only intended as a warning, in order that it shall perform its duties successfully it must be placed at such a distance from its home signal that any train which is cautioned on passing it shall be able to stop before reaching the home signal. Many distant signals do not meet this condition; they are placed not more than 1,200 ft. from their home signals. There is an immediate necessity that distant signals shall be placed not less than 1,500 ft., and possibly more, from their home signals on level track, increasing the space if there is a falling grade, and if there is a rising grade proportionately reducing it.

Home signals should be placed preferably at the fixed distance of 50 ft. from the nearest facing-point switch that they govern, and not more than 300 ft. from the farthest facing-point switch. Under certain conditions the distance between the home signal and the nearest facing-point switch is reduced to 5 ft., but it is not a desirable arrangement if it can be avoided. At trailing switches the home signal should be placed from 10 ft. to 300 ft. back of the clearance point. It must be understood as a law that signals must never overlap what is considered the danger point.

Except, I believe, on two railroads in this country, signal arms always point to the right when viewed from approaching trains which they govern, and signal posts are usually placed on the right hand side of tracks which they govern. The last rule, however, is not an invariable one. Distant signal arms are usually painted green and always have a fishtail end. Home signal arms are usually painted red and, except on one railroad, always have a square end. The red and green just mentioned are, however, only displayed on the side of the arms from which trains which they govern approach; the reverse of all arms is usually painted white. The caution position for the distant signal and the danger position for the home signal is at horizontal line. The usual clear position for both signals is at an inclination varying from 60° to 75° with the horizontal. A notable exception to the painting and position of the blades just stated is the plan adopted by the Pennsylvania lines west of Pittsburgh, for which I believe we may thank Mr. Grafton, Signal Engineer of those lines. All signal arms of the Pennsylvania Company are painted yellow (a neutral color), with black bands to emphasize them, and the positions of the signals are respectively horizontal and vertical, for danger and clear.

This plan offers many advantages: the extreme movement given to the arm removes to a large extent the likelihood of indefinite signals which are so common under the ordinary practice and are caused by the slack in long lines of uncompensated wire. This slack must, of course, be taken up by the lever before the signal will begin to move, and, as a result, instead of moving through an arc of 60 deg. or a little more, it is pulled down only one-half that angle or even less. There should be nothing uncertain as to the meaning of a signal when viewed by an engine-man. An immediate and positive impression should be conveyed to his mind, since on a fast-moving passenger train there is no time for thought after a signal comes into view and the conditions are such as to forbid the engine-man from using his judgment except in very rare instances. The rule, "When in doubt take the safest course," would in this case mean stop, and at first sight seems to cover every possible contingency; but this is one of the rules which is most easily abused, and may lead to trouble if too much dependence is placed upon it in signaling.

The other radical change in Mr. Grafton's system is the painting of the face of the arms, which, although not so important from an operating standpoint, except as it makes the blades more prominent, is perfectly consistent, and is based on the correct principle that a position signal should not be dependent in any way upon color except for the purpose of distinguishing it from surrounding objects.

One point which we have failed to appreciate the importance of in this country is that very one of lending prominence to our signals. The posts and arms are painted when they are first put in service, and then in many instances not touched with a brush for years, so that to an unpracticed eye they are hardly to be separated from the background. A signal post should be the most prominent object in any landscape which it occupies, and in order to secure this result it must be painted often in colors which contrast with each other in a violent manner and are not likely to be confused with anything against which they may be seen.

The lighting of signals at night is variously practiced, and I shall describe two systems, the commonest and the best, or rather what seems to me the best, yet devised.

Unless otherwise stated it is always assumed that a distant signal will show a green light for caution and a white light for safety; home signals will show a red light for danger and a white light for safety. There are three objections to this plan: first, the breaking of a red or green glass in the semaphore-casting (not a remote possibility when we know that boys will be boys) will result in a white instead of a colored light should the arm stand in a horizontal position; the possibility of an accident in this case is evident. Second, there is great danger that a foreign white light will be taken for a semaphore light, and be wrongly interpreted as a clear signal. Third, there is no indication when the arm is cleared as to

whether the signal is a home or a distant, since they each show a white light when in the safety position; this information should be given on general principles.

Mr. E. C. Carter, Principal Assistant Engineer of the Chicago & Northwestern, has overcome these difficulties in a most beautiful and simple manner. Here there is no white signal; therefore if one of the glasses is broken

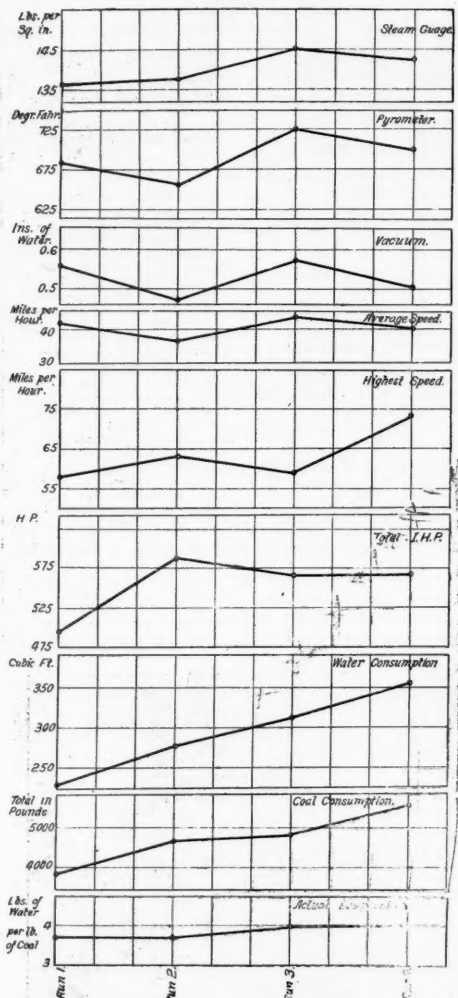


Fig. 6.—Engine No. 97.

something is evidently wrong, and in fact the engine-man, where this system is used, are instructed to the effect that a white light on a semaphore post is to be regarded as a danger signal. Neither is there any probability that a foreign light of any kind will be mistaken for one of those signals. The last objection noted with regard to the common practice of lighting is also well

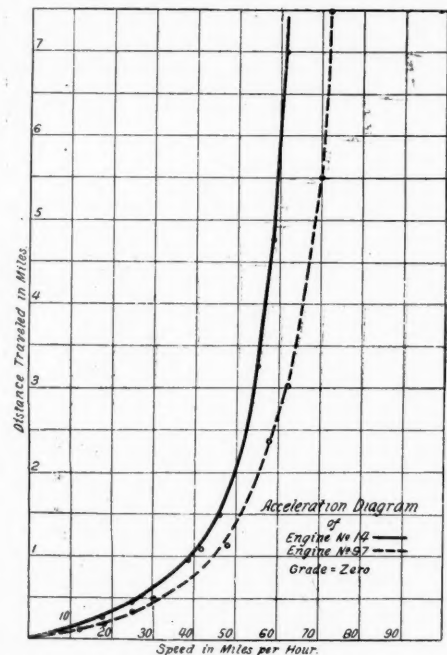


Fig. 7.

covered, since it is apparent that of the four indications given no two are alike. Mr. Carter uses an ordinary lamp on the home signal, as only one light at a time is shown; but on the distant signal post a peculiar lamp is used; it has the ordinary lens back of the semaphore glass, but outside of this a wing projects, which carries a reflector.

I must state here that the clear indication for a distant signal which I have illustrated, is not the one strictly belonging to the Carter system. Usually the lower opening in the distant signal casting is covered by a shield and covers the light from the opening in the lamp next to the post, when the signal is lowered. This arrangement, however, I do not like so well as the one which I

have embodied in the main description, since with it there is no distinction between the home and distant signals when they are in the clear position.

In the illustration is shown a scheme for lighting and painting semaphore blades, which is a combination of the Grafton colors and position with the Carter lights. The posts present here a rather bizarre appearance, but this is not objectionable in practice and will serve to attract attention the moment that the eyes of an engineman rest upon them. By this plan I believe that most of the objections to our ordinary practice are overcome. The blades are painted yellow, a color which has no significance in signaling rules, but which is plainly visible at a long distance; the triple black bands on the home and distant signals make them more prominent, while the shape of the bands on the blades and posts will identify them at a considerable distance. The advantage of the vertical position for a clear signal has already been gone into and need not be repeated now, neither is it necessary to insist any further on the superiority of the Carter system of lighting.

NOTE—G indicates a green glass and R a red glass.

A Siemens & Halske Steam Locomotive.

The first locomotive completed by the Siemens & Halske Electric Co. is shown in the accompanying illustration. As is well known, that company purchased the plant of the Grant Locomotive Works, at Chicago, after the failure of the latter company, and the engine just completed is one of 55 ordered from the Grant company by the Chicago, Burlington & Quincy. Twenty of

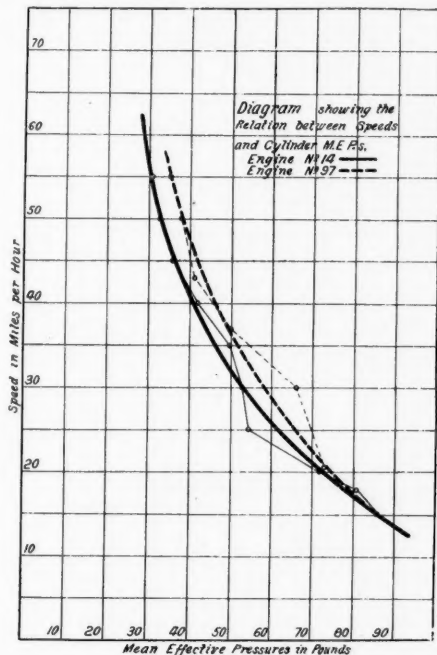


Fig. 8.

these locomotives will be completed. The original design has been adhered to, and the locomotive, as shown, is a 10 wheeler, adapted to either freight or passenger service. It has not yet been sold to any railroad, but will be kept in stock until a satisfactory disposition can be made of it. A table of general dimensions is given below:

Description.	
Type.....	10-wheel
Name of builder.....	Siemens & Halske Electric Co.
Gage.....	4 ft. 8½ in.
Simple or compound.....	Simple
Kind of fuel to be used.....	Bituminous coal
Weight on drivers.....	87,400 lbs.
" truck wheels.....	31,200 lbs.
" total.....	118,600 lbs.
General Dimensions.	
Wheel base, total, of engine.....	21 ft. 6½ in.
" driving.....	13 ft. 6 in.
" total engine and tender.....	48 ft. 10½ in.
Length over all, engine.....	35 ft. 1½ in.
" total, engine and tender.....	57 ft. 11¼ in.
Heating surface, firebox.....	138.5 sq. ft.
" tubes.....	1706.7 sq. ft.
" total.....	1845.2 sq. ft.
Grate area.....	31.5 sq. ft.
Wheels and Journals.	
Drivers, number.....	6
" diameter.....	62 in.
Truck wheels, diameter.....	33 in.
Journals, driving axle, size.....	8 × 9½ in.
" truck.....	4¼ × 8 in.
Main crank pin, size.....	5¼ × 6½ in.
Cylinders.	
Cylinders, diameter.....	19 in.
Piston, stroke.....	24 in.
Kind of piston rod packing.....	Jerome & Dunbar
Steam ports, length.....	17¼ in.
" width.....	1½ in.
Exhaust ports, length.....	17¼ in.
" width.....	3 in.
Valves.	
Valves, kind of.....	Allen Robertson
" greatest travel.....	5 in.
" outside lap.....	¾ in.
" inside lap or clearance.....	0 in.
" lead in full gear.....	¾ in.

Boiler.	
Boiler, type of.....	Straight Belpaire box
" material in barrel.....	Steel plates
" thickness of material in barrel.....	⅝ in.
" diameter of barrel.....	60 in.
Thickness of tube sheets.....	⅝ in.
" crown sheet.....	⅝ in.
Dome, diameter.....	2 ft. 4¼ in.
Tubes.	
Tubes, number.....	216
" outside diameter.....	2¼ in.
" length over sheets.....	13 ft. 6 in.
Firebox.	
Firebox, length.....	9 ft. 0 in.
" width.....	3 ft. 6 in.
" depth front.....	4 ft. 5¼ in.
" back.....	4 ft. 7¼ in.
" material.....	Steel plates
" thickness of sheets.....	⅝ in.
" brick arch? No.	
Other Parts.	
Smokebox, length.....	57½ in.
Stack, straight or taper.....	Taper

Train Accidents in the United States in July.

COLLISIONS.

REAR.

3d, on Wabash road, at Niantic, Ill., an empty engine ran into the rear of a preceding passenger train just after the latter had started from the station, damaging the rear car, which was a sleeper. The engineer and fireman were fatally injured and one passenger was considerably burned.

5th, on Pennsylvania road, near Sunbury, Pa., a passenger train ran into the rear of a preceding freight train, badly damaging the engine and 3 cars. One passenger and 2 trainmen were injured. It is said that the flagman of the freight train was thrown off the caboose by the sudden starting of the train, just as he was about to go back to flag the passenger train, and fell through a culvert. He was so badly injured that he could not get back to the track in time to stop the passenger train.

5th, midnight, on Great Northern, near Fergus Falls, Minn., a passenger train ran into a freight car which had been blown out of a side track, derailing the engine and mail car. The fireman was injured.

6th, 2 a. m., on St. Louis, Iron Mountain & Southern, at Williamsville, Mo., a passenger train ran into the rear of a preceding passenger train, derailing 3 sleeping cars. The engineer and fireman were injured.

18th, on Peoria & Pekin Union, near Pekin, Ill., a passenger train of the Chicago, Peoria & St. Louis, which had been stopped by a washout, was run into at the rear by a freight train of the Cleveland, Cincinnati, Chicago & St. Louis, which, it is said, disregarded the flag and torpedoes which had been put out to stop it. One passenger was killed and 4 were injured.

19th, on Alabama Great Southern, at Fort Payne, Ala., a freight train broke in two and the rear portion afterward ran into the forward one, making a bad wreck. A trespasser was killed.

24th, 1 a. m., on Pennsylvania road, at New Florence, Pa., a freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, wrecking 10 cars. The engine was overturned and the fireman was killed.

26th, on Pennsylvania road, at Martin's Creek, N. J., a freight train, which was stopped on account of a breakage of the engine, was run into at the rear by a following train, wrecking an engine and 19 cars. The engineer was injured.

And 4 others on 4 roads, involving 5 freight trains.

BUTTING.

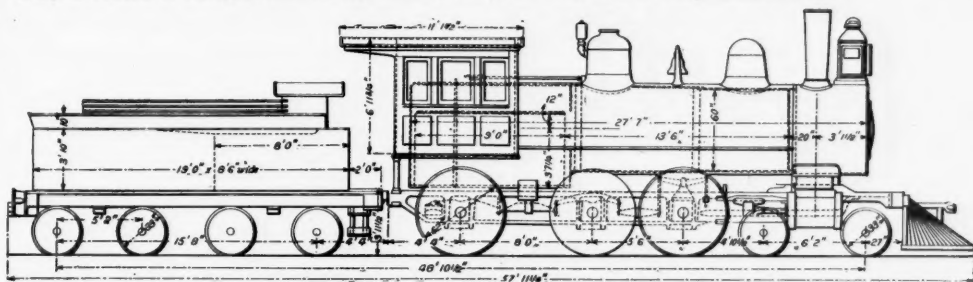
1st, 1 a. m., on Baltimore & Ohio, at Laughlin, Pa., a passenger train ran over a misplaced switch and into the head of a shifting engine, doing considerable damage. A freight brakeman was killed and the fireman injured.

9th, on Union Pacific, at Rock Creek, Wyo., butting collision of freight trains badly damaging both engines and derailing several cars. One fireman was injured. It is said that there was a misunderstanding of orders.

15th, on New York, New Haven & Hartford, at New Canaan, Conn., butting collision of freight trains, badly damaging both engines and several cars; one engineman was injured.

22d, on Western New York & Pennsylvania, near East Smethport, Pa., butting collision between a passenger train and a freight, badly damaging both engines. Three passengers and one trainman were injured. It is said that the freight train was running contrary to orders.

30th, on Central of Georgia, near Davisboro, Ga., but-



A Ten-Wheel Locomotive for Freight or Passenger Service.
Built by the SIEMENS & HALSKE ELECTRIC CO., Chicago.

ting collision of freight trains, badly damaging both engines and several cars. One engineman and 1 brakeman were injured. It is said that the eastbound train ran upon the time of the westbound in consequence of misreading an order concerning the annulment of a train.

CROSSING AND MISCELLANEOUS.

2d, on Pennsylvania road, at Summer Hill, Pa., collision of freight trains, wrecking 16 cars, which fell down a bank, took fire and were burned up. One engineer and 2 other trainmen were injured.

2d, on New York, New Haven & Hartford, near Cedar Grove, Mass., a southbound passenger train ran into the smoking car of a northbound passenger train which was crossing the track of the former diagonally, doing considerable damage and injuring 4 passengers. It is said that fixed signals formerly located at this point had been discontinued, and also that the engineman of the southbound train was not very well acquainted with the road.

4th, on Lehigh Valley, near Flemington, N. J., a fast freight train ran into an empty engine which was mov-

ing out of a side track and both engines were wrecked. One engineman was badly injured.

9th, 10 p. m., on Southern Pacific, near Ocean View, Cal., a freight train ascending a grade broke in two, and the rear portion, consisting of a caboose and 3 empty passenger cars, ran back down the grade and collided with a switching engine, wrecking the passenger cars. An engineer and 1 conductor were injured, the latter fatally. It appears that the freight train had broken in two twice before, and that the third break, leading to the accident, occurred just after the parts of the broken train had been coupled together, and before the airbrakes had been tested throughout the train.

19th, on Pittsburgh & Lake Erie, near McKee's Rocks, Pa., a freight train switching on the main track was run into by a passenger train, badly damaging both engines and the baggage car. Two trainmen and 3 passengers were injured.

25th, on Southern Railway, at Sadieville, Ky., a work train entering a side track was run into by a freight train and 2 engines and 15 cars were ditched; 2 employees were injured.

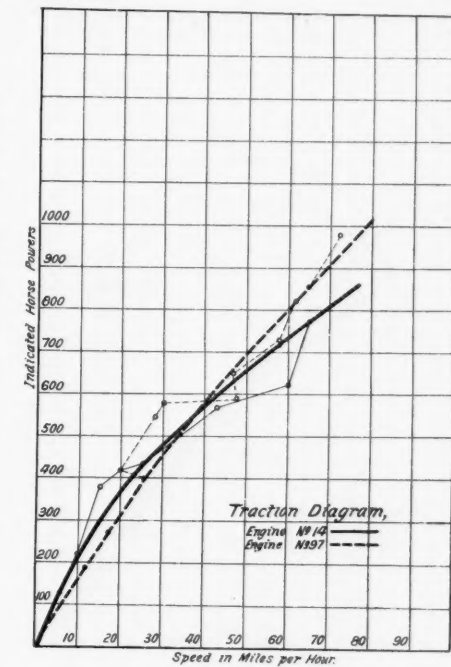


Fig. 9.

28th, 3 a. m., on Southern Railway, near Columbia, S. C., a freight train ascending a grade became stalled and the flagman went back to stop a following freight train; after he had gone some distance a coupling was broken in the attempt to start the train, and five cars, unattended, ran back down grade past the flagman and into the head of the following freight. The engine and 8 cars were wrecked and the wreck, together with 400 cords of wood piled near by, was burned up. Three trainmen were injured.

And 9 others on 9 roads, involving 1 passenger train and 15 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

2d, on Missouri, Kansas & Texas, near St. Charles, Mo., a freight train broke through a bridge over the Femme Osage River and was completely wrecked, but it does not appear that anyone was hurt. The train contained 4 dead locomotives with 5 freight cars between each two engines.

17th, on Atchison, Topeka & Santa Fe, near Monument, Col., a trestle bridge gave way under a freight train and the engine and 23 cars fell about 50 ft. to the ground below. A gang of bridgemen were at work on the bridge; the foreman, one woman and a tramp were killed, and 3 trainmen, 4 carpenters and 6 tramps were injured. The trestle was about 200 ft. long; 11 bents fell. The road was impassable a week.

26th, on Pittsburgh, Shenango & Lake Erie, near Greenville, Pa., a freight train was derailed by a defective rail and the engine and 18 cars fell down a bank. The engineman was killed.

DEFECTS OF EQUIPMENT.

7th, on Union Pacific, near Rawlins, Wyo., a fruit train was derailed by the breaking of a journal and 10 cars were wrecked. Two tramps were injured.

12th, midnight, on Baltimore & Ohio, near Mt. Airy, Md., the engine of a freight train was derailed by a drawbar lying upon the track, which had fallen from a car in a preceding train; the track was blocked about 8 hours. The engineman was killed and the fireman injured.

14th, on the Cleveland, Cincinnati, Chicago and St. Louis, at White Sulphur, O., a long freight train, running at high speed on a descending grade, was derailed by the breaking of a heated journal, and 21 loaded cars were wrecked. A tramp was killed.

17th, on Pennsylvania road, at Plymouth, Pa., 13 cars of a freight train were derailed by a drawbar which was pulled out and fell upon the track, making a very bad

wreck. The fireman, who was acting as brakeman, was killed and the conductor was injured.

19th, on Atlantic Coast Line, near Pleasant Hill, N. C., a freight train was derailed by a drawbar which was pulled out and fell upon the track, and 9 cars were wrecked. It is said that two tramps were killed.

20th, on Great Northern, near Jefferson, Mont., a freight train was derailed by a broken wheel, and 15 cars fell through a trestle bridge. A tramp was killed.

21st, on Wabash road, at Clifton, Mo., a freight train was derailed by the falling of a brake beam and several cars derailed. A passenger in the caboose was injured.

And 6 others on 4 roads, involving 6 freight trains.

NEGLIGENCE IN OPERATING.

17th, on Ohio Southern, near Springfield, O., a passenger train was derailed by a derailing switch at a crossing, the engineer being unable to control the speed, and the engine was badly damaged. A few passengers were slightly injured.

22d, on Pennsylvania road, at Landisville, Pa., a freight train ran over a misplaced switch on to a cross-

Col., a freight train was derailed by a sleeper which was floated upon the track by a flood caused by a heavy rain storm. The engine was overturned.

31st, on Florence & Cripple Creek, near Adelaide, Col., a freight train was derailed by a landslide. There was a furious storm at the time and the engineer and one brakeman were drowned before they could abandon the train for a safe place.

And six others on six roads, involving four passenger and two freight cars.

UNEXPLAINED.

2d, on Middlesborough Belt, near Middlesborough, Ky., a car in a switching freight was derailed and overturned. A brakeman was injured and a trespasser riding on the car was killed.

9th, on Pittsburgh & Western, near Town Creek, Pa., a freight train was derailed and several cars fell into the stream 40 ft. below. A brakeman was killed.

10th, on St. Louis Southwestern, at Trostville, Ark., a car in a freight train was derailed and overturned, and 17 men were injured.

OTHER ACCIDENTS.

11th, 1 p. m., on Boston & Maine, at Boston, a long passenger train of the Fitchburg road, heavily loaded, approached the station at too high speed and crashed into and wrecked the bumping-post at the end of the track.

21st, on Missouri Pacific, at Sedalia, Mo., a locomotive was badly damaged by an explosion which blew off the cap of the dome. An employee was injured.

27th, on Lake Shore & Michigan Southern near Rockfort, O., a mail car in train No. 3 took fire and was burned up.

A summary will be found in another column.

Piston Valves on the North Eastern Railway, England.

In *Engineering*, Feb. 1, of this year, was given an account of some locomotives for express service, single expansion, with inside cylinders, devised by Mr. Wilson Worsdell, Locomotive Superintendent. From that ac-

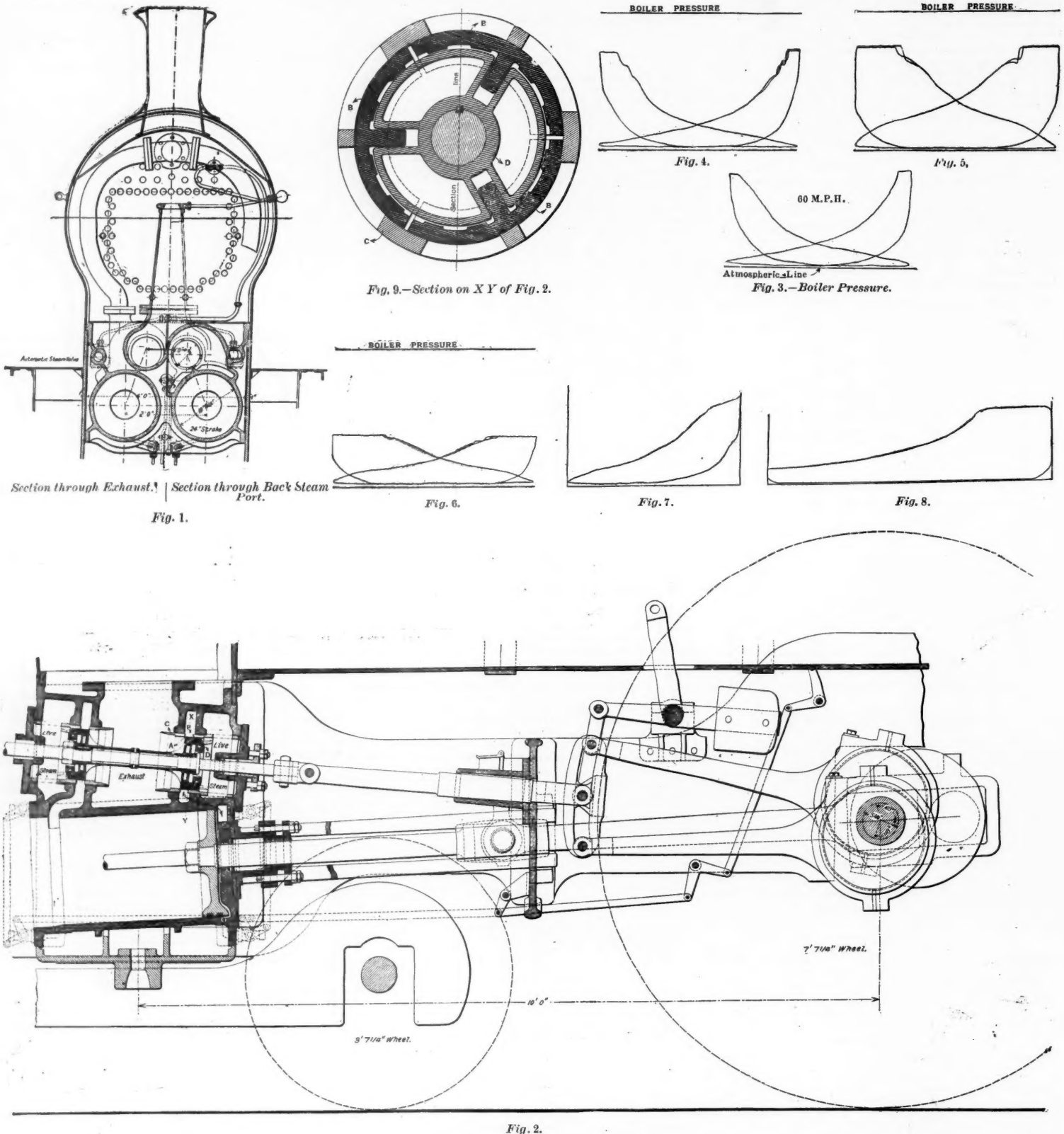


Fig. 2.

Piston Valves on the North Eastern Railway—England.

over track and was there derailed and overturned. The engineer was killed.

And 4 others on 4 roads, involving 1 passenger train and 3 freight trains.

UNFORESEEN OBSTRUCTIONS.

11th, on Illinois Central, near Ponchatoula, La., passenger train was derailed by a malicious obstruction. The engineer was killed and two other trainmen badly hurt.

18th, on Chicago, Rock Island & Pacific, near Iowa City, Ia., a passenger train was derailed at a washout and the fireman was injured.

18th, on Southern Railway, near Ooltewah Junction, Tenn., a passenger train was derailed by a malicious obstruction. The engineer and fireman were injured.

22d, on the Atchison, Topeka & Santa Fe, near Chico,

14th, on Texas & Pacific, near Handley, Tex., a passenger train was derailed at a point where new rails had just been put down and the engine was ditched; the engineer and fireman were killed.

17th, on Western New York & Pennsylvania, at Tuscarora, N. Y., a freight train was derailed and the engine and 10 cars fell down a bank. The engineer and fireman were killed.

18th, on Atchison, Topeka & Santa Fe, near Plantersville, Tex., a passenger train was derailed on a bridge and all the cars fell through; but, according to the reports, no one was killed. Three trainmen were injured.

24th, on Cleveland, Cincinnati, Chicago & St. Louis, at Hazelrigg, Ind., a freight train was derailed and 12 cars were wrecked. A tramp was injured.

And 12 others on 10 roads, involving 3 passenger and 10 freight and other trains.

count we take the illustration, Fig. 1, showing the arrangement of the piston valve, the ports and the cylinders. The other cuts we have made from original drawings, with the exception of one of the indicator cards referred to later on.

The design of the piston valve is clearly shown in Fig. 2, which also shows the links, valve rods, eccentrics, pistons, etc., and gives a better idea of the arrangement of the device than has been given in any illustration of the mechanism heretofore. The important feature about this piston valve is the scheme for permitting the escape of water trapped in the cylinders. Provision is made for the water to pass by the packing rings when the pressure is higher in the clearance spaces of the cylinder

than in the steam chest. The valve rod has an extension that passes through a front end stuffing box. The body of the piston valve is in three distinct parts, *D, D, D*, which are held on the stem, against a collar at one end, by a nut at the other end.

There are two bronze packing rings, *A* and *B*, at each end of the valve. The ring *A* is made in one piece cut through transversely at one point, as is commonly done, to permit springing to the valve seat in the bushing *C*. The ring is prevented from turning and acts in every way as an ordinary packing ring. The other ring, *B*, is made in three segments, with radial arms (shown in Fig. 9), which slide in proper grooves in the body of the valve *D*. Thus these segments will more readily leave their seat on the valve bushing *C*, and small ribs on the inner part of the segment strike the body of the valve, preventing too great a motion from the seat. In Fig. 2 it will be seen that any back pressure caused after the ring *A* cuts off the exhaust can not escape until it exceeds the live steam pressure, whereupon the segments *B* lift like pop valves and permit escape of the excessive back pressure into the live steam chest.

The steam ports are $1\frac{1}{2}$ in. wide and have a total length of about 18 in. The eccentric rods take hold of the end of the link, which has a radius of 47 ins. The throw of the eccentric is $2\frac{1}{4}$ ins.; this makes the maximum travel of the top of the link $5\frac{1}{2}$ ins. The maximum valve travel is $3\frac{1}{2}$ in.

There has been some criticism of the indicator cards sent out as having been taken from this locomotive. See *Railroad Gazette* June 7, 1895, p. 355. Also Western Railway Club *Proceedings*, February, 1895. Therefore we deem it important to describe somewhat minutely the action of the valve gear. The indicator cards that we refer to are exemplified by Fig. 3, taken from *Engineering*. The speed is given as 60 miles an hour, but the drivers are 7 ft. $7\frac{1}{2}$ in. diameter, or 10 per cent. larger

those given on the cards. The reason for the drop between the boiler and the steam chest is not given.

Fig. 7 shows the best admission line we have been able to get in this country at sixty miles an hour with a port opening about $20 \times \frac{1}{4}$ in., and it is not clear how, on the Northeastern engine, it has been possible to do so much better. In answer to our inquiries, Mr. Worsdell sends the following:

"I was not surprised to hear that your people thought that the indicator had come to a sudden stop. This was not so. My chief draughtsman, Mr. Smith, makes a point of seeing that the indicators are adjusted so as to allow the pencil to travel the full height of the card and only uses springs which will admit of this.

"In the case of the sheet of diagrams sent you, the indicator was, as usual, examined before and after use, and an examination of the cards will show that, although taken consecutively, in one trip their height varies to the amount of about 17 lbs., caused by the varying pressure of the steam in the steam chest.

"As this matter seems to be exciting considerable interest on your side of the water, I enclose you three original cards, marked 4, 5 and 6. No. 6 has all the good points exhibited by the others, although it is not nearly the same height. The reduction in height is due to the regulator being opened only sufficiently to admit steam enough to drive the engine, thus reducing the pressure of steam in the steam chest, and it proves that the sharp cut-off does not vary with varying conditions.

"The real reasons, in my opinion, for such good results are: That the piston valve offers advantages in the distribution of the steam not possessed by the slide valve, and that, in this case, nothing that long experience in the designing of locomotive work teaches has been neglected."

The reasons for the peculiar contour of the expansion line just after cut-off are not explained and taking the whole engine and valve motion together, it will be found an interesting conundrum, for those who like steam engine puzzles, to show why it is that such a perfect card can be obtained from this engine; the exactness of contour at cut-off being superior to that obtained from the Corliss engine at low speeds, see Fig. 8.

Mr. Worsdell sends also the following information about piston valves which may be interesting to mechanical engineers on several railroads here who are now experimenting with that type of valve:

"Since March, 1894, 8 engines with slide valves and

of repairs. The piston valves being practically frictionless, it is easy to understand that the wear and tear of working parts has proved to be very light.

"The difficulty hitherto with the piston valves has been the trapping of water in the cylinders, and so forming an absolute block. Mr. Smith has overcome this difficulty, his valves giving practically unlimited escape for the trapped water."

Truck for Chesapeake & Ohio 40-Ton Car.

The drawings shown herewith illustrate a truck which has just been designed by the motive power department of the Chesapeake & Ohio for freight cars of 80,000 lbs. capacity. The wheel base, 5 ft., is the same as that of the standard trucks of this road for lighter cars. The diameter of the axle at the middle is 5 in. Wheels weighing 600 lbs. each will be used and the diameter of the axle at the wheel fit will be 6 in. The arch bars, both top and bottom, are $1\frac{1}{2}$ in. thick by 4 in. wide. It will be noted that the bolster has no truss rods. In place of this method of strengthening, the bolster is "sandwiched" with two plates of wrought iron as shown in the cut. These plates are one inch thick and are as wide as the full depth of the bolster at all points.

The brakes on this truck are inside hung, as will be seen from the plan. The brake rigging is omitted from the side elevation in order to avoid confusing the drawing, and the shoe and hangers are shown in a separate view. The hangers, A1 and B1, are attached at points A and B.

The New Interchange Association—Revised Agreement.

The revised agreement adopted July 30 and which takes effect September 1, is as follows:

We, the undersigned, on behalf of our respective roads, agree to interchange cars, with the understanding that in addition to the provisions of the Master Car Builders' Rules of Interchange, car owners shall be charged for the repairs of their own cars, with the following exceptions and conditions:

A.—Damage caused by derailment, wreck, train parting, collision, fire or evident carelessness in handling cars shall not be chargeable to owners.

B.—Charges for damage to draft rigging and sills shall be made in accordance with the following, the parts referred to being:

1. Couplers or drawbars.
2. Drawbar springs.
3. Drawbar pockets, spindles or their substitutes, and followers.
4. Draw lugs and attachments, carry irons and filling blocks.
5. Draw timbers or their substitutes.
6. Deadwood or buffer.
7. End sills.
8. Longitudinal sills.

Damage to any of the items above numbered 1 to 8, shall not be charged for, if accompanied with simultaneous damage to other items, as follows:

1. If accompanied with damage to either 4, 5 or 7.
2. If accompanied with damage to either 4, 5 or 7.
3. If accompanied with damage to either 5 or 7.
4. If accompanied with damage to either 1, 2 or 7.
5. If accompanied with damage to either 1, 2, 3 or 7.
6. If accompanied with damage to 7.
7. If accompanied with damage to either 1, 2, 3, 4, 5 or 6.
8. If accompanied with damage to 7.

C.—In the case of damage to longitudinal sills, bills shall not be rendered if the damage is so extensive as to require the replacement or repairs to more than two sills in a car.

D.—In the case of end or corner posts, bills shall not be rendered if the damage is of such a character as to require the replacement or repairs to more than two ends or two corner posts at one end, or more than one end and one corner post at the same end of car.

E.—Any damage caused by cornering or raking cars to be assumed by the company so damaging the car.

It is further understood and agreed:

1. That cars which are the properties of railroad companies party to this agreement, shall be interchanged between the parties hereto without requiring cards for defects for which the owners may be charged.

2. That in receiving cars from railroad companies, not parties to this agreement, or in interchanging cars not belonging to parties to this agreement, the rules of the Master Car Builders' Association for the interchange of traffic shall prevail.

3. That nothing in this agreement shall be so construed as to require any of the parties hereto to accept cars which may in their opinion be unsafe to run, or unsuitable for carrying freight, or with defects for repairs of which they are not authorized to bill, unless the party offering the car furnishes a proper M. C. B. defect card.

4. That in case any party to this agreement should be required to furnish M. C. B. defect cards for any of the items covered by this agreement on cars owned by any party to this agreement, and a bill be rendered on such card, the bill and card or a duplicate of the same shall be a voucher against the party owning the car for an amount equal to the amount of such bill.

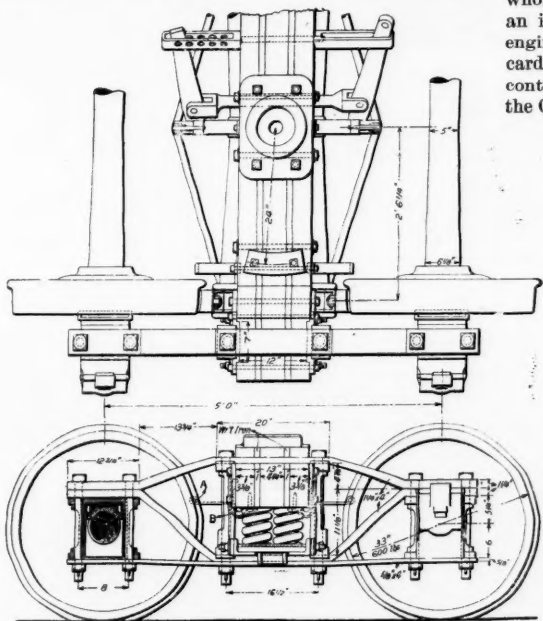
5. Bills rendered under this agreement shall be marked on the face of bill, "New Interchange" and shall not include any items rendered under M. C. B. rules.

6. That in case any party shall make repairs under this agreement, such repairs shall be made strictly in accordance with Master Car Builders' Rules. Evidence that the repairs have not been so made will be authority for non-payment of bill, or for rendering counter bill in case original bill for repairs has been made. When repairs cannot be made in accordance with M. C. B. rules, the party making the wrong repairs shall card for the same.

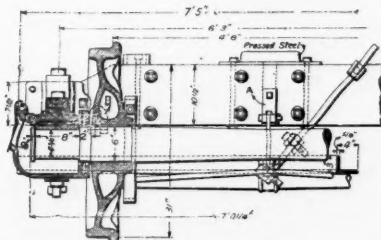
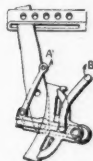
7. If cars offered in interchange have missing material (bolts and nuts excepted) the receiving road may require a card covering such missing material, which card shall be a voucher against the railroad furnishing it for the cost of repairs.

8. If M. C. B. couplers, brake beams, brake levers, top and bottom brake rods, air brake hose, are lost or missing on a line, they shall be replaced at the expense of the road handling car when such loss occurred, so far as material is concerned, but the owner may be charged for the labor involved in replacing such material.

9. When repairs are made under this agreement, a repair card shall be securely attached to the car. This



Truck for Freight Car of 80,000 Lbs. Capacity, Chesapeake & Ohio Railway.
Mr. W. S. Morris, Superintendent of Motive Power.



than usual in this country, and we have no other data about this card, except that the boiler pressure is intended to be 175 lbs., and the initial pressure shown by this card is but 133 on one end and 139 on the other, which shows that if the boiler pressure was maintained there was considerable wire-drawing between the boiler and the cylinders. Even at 25 miles an hour the initial pressure is but 136 lbs., which is 29 lbs. below the boiler pressure. If this reduction is due to wire-drawing, it is not possible that the indicator cards could show such a sharp cut-off. For that reason, as the cut-off is remarkably sharp, one might be led to conclude that the boiler pressure when the cards were taken was not 175 lbs. To the contrary, however, it is said that the boiler pressure was maintained and the pressure reduced by closing the throttle.

The valve gear in construction is shown in Fig. 2. The details of the port openings in forward gear are given in the table:

Cut-off.		Lead.		Steam port opening.	
Front end.	Back end.	F	B	F	B
Per cent.	Per cent.	Inches.	Inches.	Inches.	Inches.
60	59	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{11}{16}$	$\frac{13}{16}$
47	48.5	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{11}{16}$	$\frac{13}{16}$
32	31.75	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{11}{16}$	$\frac{13}{16}$
18.25	17.5	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{11}{16}$	$\frac{13}{16}$
8.5	7	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{11}{16}$	$\frac{13}{16}$

It will be seen that the port opening at about 18 per cent. cut-off is only $\frac{1}{4}$ of an inch and but 18 in. long, and, therefore, it is no greater, but is less than is commonly obtained in this country with slide valves at the same cut-off. The port opening, therefore, does not account for the sharpness of the cut-off on the indicator cards. Figs. 4, 5 and 6 show indicator cards reproduced exactly from some of the indicator cards sent us and said to be exactly as taken. The boiler pressures and speeds are

one with piston valves, precisely similar in all other respects, have been working the express traffic between Newcastle and Edinburgh. During the six month ending December 31, 1894, the piston valve engine ran 28,890 train miles, an average of 4,815 per month; the train averaged 12 carriages, and the coal burned, including lighting up and light running, averaged for the six months 29.5 pound per mile. This is considerably less than the consumption of any of the slide valve engines during the same period; the one which came nearest being 2.78 pounds per mile heavier. The train miles run by the piston valve engine were also in excess of those of the other engines. For every 10,000 miles run the loss in weight of the piston valves for each cylinder was 3.21 ounces, and the wear .0038 inch.

"The compound goods engine having a high-pressure cylinder, 18 in. \times 24 in., a low-pressure cylinder, 26 in. \times 24 in., and 6 coupled wheels 5 ft. in diameter, has been in constant work for three years, and on the main line through express goods trains, has averaged 39,000 miles yearly; the average load was 39 wagons, and the coal consumption during the three years ending December, 1893, averaged 33.6 lbs. per mile. This engine is fitted with piston valves, and has made a greater mileage than either of the 14 other engines working in the same line, the only difference being that the latter engines are fitted with ordinary slides. Their average consumption was 36.2 pounds per mile.

"During a special trial, lasting 12 days, in October, 1893, with four other engines of the same type, the piston valve engine averaged 32.7 lbs. per mile. The nearest engine of the slide valve type burned 35.1 lbs., and the average of the four was 36.85 lbs. The coal in this trial was weighed on the engines daily.

"Of course you are aware that some consider the cost of fuel as a comparatively small item in the working expenses of a railway. A matter of much more importance than the saving of coal is the cost and demurrage

card shall specify fully the repairs made, the date and place where made, and name of road making repairs.

The card shall be provided with a stub which will duplicate the information on the card, and stubs must be forwarded to the owner of car on the first and fifteenth day of each month.

The repair card shall be $3\frac{1}{2} \times 8$ inches, and the stub $3\frac{1}{2} \times 4$ inches. The cards shall be printed on both sides and shall be filled out on both sides with ink or indelible pencil.

10. In case any party to this agreement may desire any other party to hold material removed from cars, under this agreement, for inspection, the same shall be held, after notice has been received, for a period not exceeding thirty days subsequent to the date of repairs to such car.

11. Switching roads—Railroads not forming parts of systems, and transfer roads, owning less than 500 cars, will not be allowed to render bills under paragraphs B, C and D, and will be held responsible for all new defects which may be caused while cars are in their possession. The same exceptions will be made to the equipment of these lines when it is on roads that are not exempt from provisions of paragraphs B, C and D.

12. Bills made under this agreement will be outlawed, if not received by the car owner in not less than six months after date the repairs are made.

13. That there be an Executive Committee of five appointed to whom disputes shall, under this agreement, be referred, their decision to be final and binding; also to make rules for the transaction of the business of this Association.

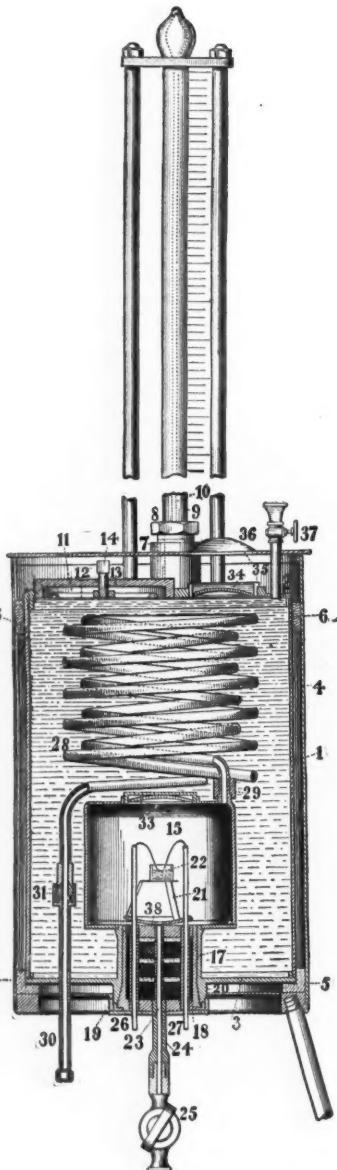
14. Any railroad may become party to this agreement by notifying Chairman of Executive Committee and signing agreement.

15. That this agreement may continue indefinitely, and that any party hereto may withdraw from the agreement by giving notice to that effect in writing to Chairman of Executive Committee, said notice to be given at least thirty (30) days prior to the date on which such withdrawal goes into effect.

The roads, other than those terminating in Chicago, which have adopted the agreement, are: B. & O. S. W.; B., C. R. & N.; C. & O.; C., P. & St. L.; C. & W. M.; C., H. & D.; C., N. O. & T. P.; C., C. & S.; D., L. & N.; G. B., W. & St. P.; I., I. & L. E. & W.; L. & N.; N. Y., O. & N.; P. & P. U.; P. & W.; P., S. & L. E.; P., A. & W.; P., R. & N. E.; T., A. A. & N. M.; Valley.

A New Coal Calorimeter.

The new coal calorimeter invented by Prof. R. C. Carpenter, of Cornell University, is easy of operation, simple in construction and gives the calorific power of fuels directly in British Thermal Units.



Professor Carpenter's New Coal Calorimeter.

It is designed to do away with objectionable features, such as errors due to the thermometer, the determination of the water equivalent of the calorimeter, and corrections for evaporation, radiation and specific heats.

The principle of this calorimeter is to measure the calorific power of the fuels by the expansion of a liquid, it being in fact a large thermometer, in the bulb of which combustion takes place, the heat being absorbed by the liquid in this bulb, and rise of temperature noted by the height of a column of the liquid in a graduated glass tube. The values of the divisions in this tube are obtained by burning different weights of pure carbon, the B. T. U. in one pound of which are usually given as 14,500.

Figure 1 shows a sectional view of the instrument. It consists of a combustion chamber, 15, which has a removable bottom. Oxygen is supplied through tube 23 to assist combustion, the products of which are discharged through the spiral tube 28, 29, and a small pin hole in the end of tube 30. Surrounding the combustion chamber is a larger closed chamber, 1, filled with water and connecting with the open glass tube 9, 10, which is graduated, as before stated.

The top of chamber 1 is closed with a diaphragm 12, which is used to adjust the zero level in the glass tube by means of screw 14. The process of combustion is observed through glasses 33, 34 and 35. A funnel, 37, is provided for filling or emptying. The calorimeter proper is carried in an outer case, 4, from which it is insulated by strips of felt, 5 and 6. The plug 17, which closes the bottom of the combustion chamber, is made of alternate layers of rubber and asbestos fiber, and carries a dish, 22, in which is placed the fuel for combustion. This fuel is ignited by an electric current carried by wires in two tubes of vulcanized fiber, 26, 27, and connected inside the combustion chamber by a thin platinum wire, 15. These tubes, 26, 27, are capable of vertical adjustment. On top of this plug is a silver mirror, 38, to reflect any radiant heat.

The method of using this calorimeter is to put a sample of the fuel, finely ground, into a small porcelain or asbestos dish. After accurately weighing it, it is introduced into the calorimeter and the oxygen gas started flowing. The charge is fired by pressing a key, and the instant the coal is ignited, the current is shut off and the reading of the scale taken. This gives the correction for heat from electric wire, and is merely subtracted from final reading. The time of combustion is noted, and after it is completed the reading in the scale is taken again. Allow the calorimeter to stand the same length of time that it took for combustion and again read the scale. The difference in readings before and after standing gives correction for radiation, which must be added. Divide the reading of scale, after corrections have been made, by the weight in pounds of sample, and the result is the B. T. U. per pound.

Poor's Manual for 1895.

Poor's Manual for the present year is about ready for delivery and advance sheets of the introduction have already been sent out. We give below the principal totals of the statistics of the railroads of the United States for their respective fiscal years ending in 1894.

Length of track laid up to December 31, 1894. 179,279.31 miles
Of which were completed up to the close of the fiscal years of the respective companies. 178,118.76 miles

Completed since close of their fiscal years. 1,160.54 miles
Net increase of mileage of all railroads in the United States in the calendar year 1894. 1,821.38 miles

LIABILITIES AND ASSETS OF THE COMPANIES OWNING THE ABOVE 178,118.76 MILES OF LINE.

Liabilities.	
Capital stock.....	\$5,075,629,070
Funded debt.....	5,665,734,249
Unfunded debt.....	383,567,232
Current debt.....	410,669,646
Total Liabilities.....	\$11,535,600,297

Assets.	
Cost railroad and equipment.....	\$9,789,543,401
Real estate, stocks, bonds, and other investments.....	1,667,879,162
Other assets.....	240,526,350
Current accounts.....	226,523,371
Total assets.....	\$11,924,450,884
Excess of assets over liabilities.....	\$388,850,687

The mileage, liabilities and assets of elevated railroads in New York State are included in the foregoing.

STATISTICS OF OPERATIONS, FISCAL YEAR 1894.

Miles of railroad operated (including elevated railroads).....	175,508.40
Passenger train mileage.....	327,211,826
Freight train mileage.....	175,739,885
Mixed train mileage.....	13,381,041
Total revenue train mileage.....	516,332,752
Passengers carried.....	583,48,007
Passenger-mileage.....	13,600,531,635
Tons freight moved.....	675,122,747
Tons freight moved one mile.....	82,289,402.98
Earnings.—Passenger.....	\$276,031,571
Freight.....	700,477,409
Other.....	91,134,533
Elevated Railroads (New York).....	12,661,502

Total traffic revenue.....	\$1,083,305,015
Operating expenses.....	757,765,739
Net earnings.....	\$325,539,276
Other receipts, including rentals received by lessor companies.....	96,477,443
Total available revenue.....	\$419,016,719

Payments from Available Revenue:	
Interest on bonds.....	\$237,620,367
Other interest.....	7,464,971
Dividends.....	85,278,669
Rentals, tolls, etc.....	62,900,454
Miscellaneous.....	38,220,492
Total.....	\$429,484,953
Balance.—Excess of fixed charges and miscellaneous payments over net available revenue.....	\$10,468,234

The liabilities, gross and net earnings, interest and dividend payments, etc., of the elevated railroads in the State of New York are included in the above table, but the statistics of their passenger traffic and train mileage are omitted.

Certain comparisons between 1894 and 1893 are shown as follows (last three figures in columns A, B and C omitted, except in lines marked †):

	1894. A	1893. B	Decrease C	P. c. of inc. or dec.
Freight ton mileage.....	82,289,400	90,552,087	8,262,686	9.12
Passenger mileage.....	13,600,531	15,146,711	1,546,180	10.20
Freight earnings.....	\$700,477	\$808,494	\$108,017	13.36
Passenger earnings.....	276,031	311,978	35,947	11.72
Other earnings.....	91,134	88,168	2,966	3.36
Earnings of elevated roads.....	12,661	13,976	1,315	9.41
Total gross earnings.....	\$1,080,305	\$1,222,618	\$142,313	11.64
Net earnings.....	322,539	364,591	42,051	11.53
† Earn. per ton per mile.....	0.851c.	0.893c.	0.042c.	4.70
† Miles of road operated.....	175,444	173,370	2,074	1.19

*Increase.

Further statistics of the two years are given as follows (000 omitted except where marked †). In the following items the statistics of the elevated railroads in New York state are omitted:

	1894.	1893.
†Locomotives.....	31,813	36,012
†Cars, passenger.....	26,345	27,199
†Cars, baggage, mail, etc.....	7,937	7,805
†Cars, freight.....	1,191,866	1,161,282
†Total revenue cars.....	1,226,148	1,196,256
Liabilities:		
Capital stock.....	\$5,075,624	\$5,021,576
Bonded debt.....	5,665,775	5,540,225
Unfunded debt.....	382,927	409,969
Current accounts.....	438,911	381,475
Total liabilities.....	\$11,455,220	\$11,353,286
Excess of assets over liabilities.....	333,205	406,750
Total:	\$11,808,425	\$11,730,036
Assets:		
Cost of railroad and equipment.....	9,693,141	9,573,703
Real estate, stocks, bonds and other investments.....	1,651,366	1,671,841
Other assets.....	238,306	244,614
Current accounts.....	225,612	239,878
Total assets.....	\$11,808,425	\$11,730,036
†Miles of railroad operated.....	175,444	173,370
Rev. Train Mileage:		
Passenger.....	327,211	340,352
Freight.....	175,739	531,340
Mixed.....	13,381	17,751
Total.....	516,332	889,444
Passenger earnings.....	\$276,031	\$311,978
Freight earnings.....	700,477	808,494
Miscellaneous.....	91,134	88,168
Total.....	\$1,067,643	\$1,208,641
Net earnings.....	317,757	358,618
Receipts from other sources.....	86,152	111,166
Total available revenue.....	\$413,916	\$469,815
Payments:		
Rentals, tolls, etc.....	60,840	64,698
Interest on bonds.....	234,702	237,857
Other interest.....	7,444	7,107
Dividends on stock.....	83,478	94,195
Miscellaneous.....	38,220	58,190
Total payments.....	\$424,686	\$442,150
Balance surplus or deficit.....	D. \$10,770	S. 27,665

The introduction to the Manual fills 32 pages and is about twice as large as that of last year. The statements of stock, debt, earnings, interest and dividends are given for 18 years. A statement showing the principal items for the leading trunk lines is given for 1870, 1880 and 1890-1894 inclusive. This statement represents the business of 28 companies in 1870 and 62 companies in 1894. The 62 companies operate 63 per cent. of the railroad mileage of the country and carry 70 per cent. of the ton mileage. On these roads the average rate per ton per mile was 0.832 cent, which is 0.019 cent less than the general average for the whole country. Their average passenger rate was 2.005 cents as compared with 2.030 cents for the whole country.

The totals of cars, engines, miles of steel rails, etc., are given for 15 years. The statement showing stocks and bonds is given by geographical groups for 12 years, and the same is true of the statement showing passenger and freight traffic and gross and net earnings, with averages per unit and per mile of railroad. In the table from page xi., part of which we copy below, the dividends on stock and interest on bonds are averaged for the whole of the stocks and bonds represented; but in a large table, showing these items by groups for 12 years, the dividends and interest on productive stocks and bonds are averaged separately. For the whole United States the average dividend paid on productive stocks in 1894 was 4.80 per cent., as compared with 4.84 for 1893 and 4.40 for 1892. The interest on productive bonds was 4.73 in 1894, 4.69 in 1893, and the same in 1892. In 1894 the holders of 64.98 per cent. of the railroad stock of the country received no dividends. This is the largest percentage ever reported.

Another large table gives the mileage, capitalization and dividend and interest payments of each of the large roads of the country for three years, 1891, 1892 and 1893 (but not for 1894), and supplementary tables give the passenger and freight traffic, with averages, of the same roads. These three-year tables take up nine pages.

The total net increase in mileage of railroads for the year, as given at the beginning of the introduction—1,821 miles—is 336 miles less than the amount reported as con-

structed during the year, that length of road having been reported as abandoned or converted to other uses, such as electric roads, etc.

While the average amount of stock and bonds per mile of railroad increases from year to year the average per mile of track is being gradually lowered, showing that additional main tracks and additional tracks in yards are being constructed without large increases in capital accounts. The following table is shown:

	1894.	1890.	1885.
Miles of railroad.....	178,119	163,420	127,729
Miles of track.....	232,919	208,303	164,597
Stocks and bonds, millions.....	\$10,741.4	\$9,746.1	\$7,533.4
“ “ “ per mile of road.....	60.315	59.639	59.371
“ “ “ per mile of track.....	45.686	46.788	47.220

On page xi. of the introduction there is a comparative statement of averages for eight years, from which we take the following:

	1894.	1893.	1892.
Capital stock per mile of completed road.....	\$28,691	\$28,513	\$28,680
Bonded debt per mile of completed road.....	\$32,141	\$31,119	\$31,845
Total stock and bonds per mile.....	\$60,832	\$59,632	\$60,525
Cost of road and equipment per mile of completed road.....	\$55,641	\$54,447	\$54,644
Pass. earnings per mile of road in operation.....	1,573	1,799	1,721
Freight earnings per mile of road in operation.....	3,993	4,063	4,787
Gross earnings per mile of road in operation.....	6,085	6,971	6,986
Net traffic earnings per mile of road in operation.....	1,811	2,063	2,068
Percentage of expenses to earnings.....	70.24	70.42	70.4
Pass. earnings per pass. train mile.....	0.844	0.917	0.906
Freight earnings per freight train mile.....	1.772	1.522	1.559
Gross earnings per revenue train mile.....	1.365	1.359	1.373
Gross exp'nses per revenue train mile.....	0.916	0.957	0.970
Net earnings per revenue train mile.....	0.389	0.402	0.408
Pass. earnings—Proportion of gross.....	P. c.	P. c.	P. c.
Freight earnings—Proportion of gross.....	55.61	66.89	68.52
Other earnings—Proportion of gross.....	44.39	33.11	31.48
Earnings per passenger per mile.....	2.030	2.046	2.143
Earnings per ton per mile.....	0.851	0.893	0.967
Average distance per passenger.....	Miles.	Miles.	Miles.
Average haul of freight.....	23.32	24.39	23.79
Interest per cent. of bonds.....	4.11	4.30	4.25
Interest per cent. of bonds and debt.....	3.93	4.01	4.16
Dividends per cent. of stock.....	1.64	1.86	1.93
Int. and div. p. c. of stock, bonds and debt.....	2.89	3.02	3.01

An interesting statement is presented showing the mileage of the leading railroad systems for the two years 1880 and 1895:

	1880 Miles.	1895 Miles.
GROUP 1.		
Boston & Albany.....	382	389
Boston & Maine.....	204	1,504
Central Vermont.....	554	772
Fitchburg.....	152	450
Maine Central.....	355	822
New York & New England.....	293	559
New York, New Haven & Hartford.....	202	1,469
GROUP 2.		
Baltimore & Ohio.....	1,449	3,694
Central of New Jersey.....	514	672
Delaware, Lackawanna & Western.....	670	901
Lehigh Valley.....	544	1,103
New York Central & Hudson River.....	1,109	2,685
New York, Lake Erie & Western.....	1,110	2,076
New York, Ontario & Western.....	345	477
Pennsylvania.....	6,121	7,431
Philadelphia & Reading.....	1,709	1,027
GROUP 3.		
Chicago & Eastern Illinois.....	131	516
Chicago & Alton.....	840	843
Chicago, Burlington & Quincy.....	2,772	7,206
Chicago & North Western.....	2,789	7,940
Chicago, Milwaukee & St. Paul.....	3,893	6,148
Chicago, Rock Island & Pacific.....	1,349	3,663
Cleveland, Cinclin., Chicago & St. Louis.....	772	2,246
Illinois Central.....	1,891	3,695
Lake Shore & Michigan Southern.....	1,178	2,141
Michigan Central.....	804	1,614
Wabash.....	2,470	1,979
GROUP 4.		
Chesapeake & Ohio.....	437	1,363
Norfolk & Western.....	428	1,570
Southern Railway.....	449	4,774
Georgia Railroad and Banking Co.....	307	526
Atlantic Coast Line.....	*	1,337
Plant System.....	*	1,467
GROUP 5.		
Louisville & Nashville.....	2,348	4,831
Nashville, Chattanooga & St. Louis.....	508	906
Mobile & Ohio.....	528	688
GROUP 6.		
Atchison, Topeka & Santa Fe.....	2,206	9,221
International & Great Northern.....	541	825
Kansas City, Ft. Scott & Memphis.....	305	1,196
Missouri, Kansas & Texas.....	879	2,232
Missouri Pacific.....	1,537	5,147
St. Louis Southwestern.....	70	1,223
Texas & Pacific.....	444	1,499
GROUP 7.		
Burlington, Cedar Rapids & Northern.....	564	1,134
Chicago Great Western.....	*	922
Great Northern.....	860	4,328
Northern Pacific.....	1,193	4,688
GROUP 8.		
Denver & Rio Grande.....	758	1,759
Southern Pacific.....	730	7,992
Oregon Railway & Navigation Co.....	178	1,659
Union Pacific.....	3,758	4,904
CANADA:		
Canadian Pacific.....	*	7,178
Grand Trunk.....	1,267	4,393
MEXICO:		
Mexican National.....	*	1,232
Mexican Central.....	*	1,876

The systems marked with an asterisk (*) in 1880 were not in existence as systems in that year, although most of the roads now comprised in them were in operation, but as independent lines.

The 11 large roads west of Chicago now have an aggregate mileage of 63,909 miles.

The Manual now contains statements of the financial condition of states, counties, cities and towns, industrial enterprises, etc., so that it claims to cover the entire field of investment in the United States. A large number of important railroad companies still make their reports at the close of the calendar year, so that although the ma-

jority have adopted June 30 as the date for closing their fiscal years it is still impracticable to issue the Manual any earlier than heretofore.

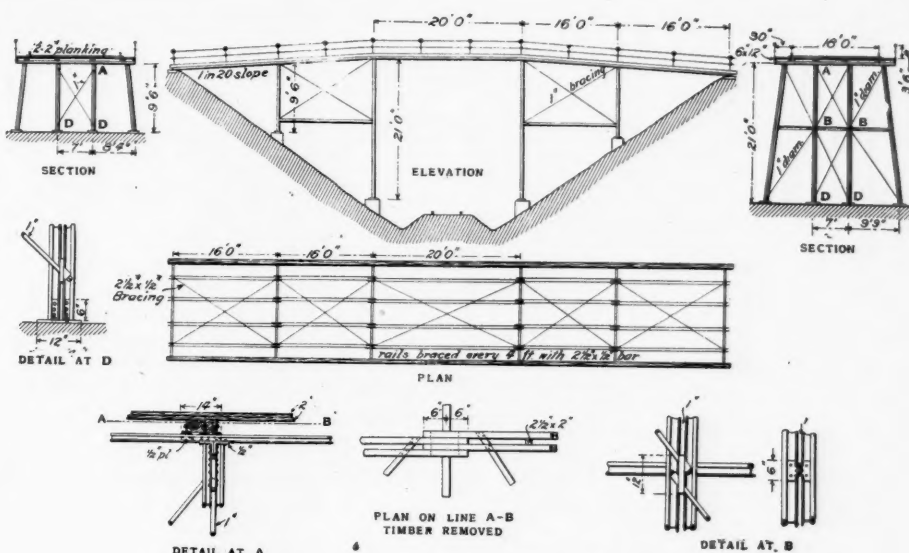
Another Bridge of Old Rails.

The illustration shows details of a bridge which carries a highway across the Ontario division of the Canadian Pacific, between Toronto and Owen Bay. The bridge was designed by Mr. F. S. Williamson, and was built in 1883. The road which is spanned by the bridge was originally the Toronto, Grey & Bruce Railway, a narrow-gauge road laid with 45-lb. rails. After its acquisition by the Canadian Pacific it was changed to standard gauge and laid with heavier rails. This was from 1881 to 1884, and at the same time all wooden bridges on the main line were replaced by steel structures. There were 50 or 60 of these in all.

About six of these rail bridges were built at various crossing points for the purpose of utilizing the old light weight rails of the narrow gauge roadway.

The Illinois Steel Company's Plate Mill.

The plate mill and open hearth plant of the Illinois Steel Company, at South Chicago, Ill., have been in operation since February 12, 1895, and are now prepared to fill orders for open hearth plate steel according to any specifications. They have already filled orders for flange, tank, marine and firebox steel, the daily output now being about 150 tons, although the maximum has been almost double that. They have furnished steel to the Chicago, Burlington & Quincy Railroad, Standard Oil Co., Fox Solid Pressed Steel Co., Lassic Bridge & Iron Works, Wickes Bros., Edward P. Allis Co., and others. One of the first plates rolled was some 1/2-in. x 122-in. x 131 1/2-in. for the Standard Oil Co., at Whiting, Ind. The plates for a 24-ft. plate steel fly-



A Bridge of Old Rails Over the Canadian Pacific Railroad.

wheel, recently made by the Edward P. Allis Co., were rolled here.

Steel with the amount of phosphorous as low as .003 per cent. has been made, percentages of .006, .007, .008 and .009, being commonly made.

The open hearth plant consists of four 20-ton and two 30-ton furnaces, the two 30-ton ones being tipping furnaces designed by Mr. S. J. Wellman. The charging floor is 12 ft. above the ground, the materials being raised by an hydraulic lift which works in helical guides. The object of these is to turn the car through 90 degrees, while ascending because the tracks on the charging floor are at right angles to those on the ground. After arriving on the charging floor tracks the scrap, which is contained in iron boxes, is put in the furnaces by the charging machine. Electricity forms the motive power for this machine, a trolley line for supplying the current, and Gibbs motors being used. Air hoists are employed to raise the doors of the furnaces. An electric traveling crane covers the charging floor and furnaces, and a similar one controls the floor in front of the furnaces. This is used for handling the ingots and ladles, etc. Four more furnaces are now in process of construction, and it is hoped will be in use by Jan. 1.

The plate mill consists of a group of connected buildings, which, taken in the order in which the plate is made and handled, may be called the furnace room, plate mill proper, the house containing the beds for cooling, and the shearing and shipping house. There are four heating furnaces arranged in a row parallel to the rolls. Ingots are brought in on cars, and charged into and withdrawn from the furnaces by a charging machine which is also operated by electricity from trolley lines. Motors are used to run the pumps on this charging car, which furnish the hydraulic power for the tongs. Air hoists are again used in this house to open the furnace doors. The treated ingots, after being withdrawn from the furnaces, are put on a small tipping car which is

hauled by a cable up to the tables which deliver the ingot to the rolls. When the car reaches the tables it is lifted on the outer side by a ram, and the ingot slides on to the tables. There are two sets of rolls, one 90 in. next to the engine, which is a Porter-Allen 54 in. x 66 in. and one 132 in. They are operated through a set of 28-in. pinions. It is seen that by these rolls it is possible to roll plates of great variations of widths and thickness. The 132-in. rolls are said to be the largest in the country. There is a 30-ton traveling crane over the rolls and a roll lath which is in the end of the building. The plate is carried by roller conveyors to the calling beds where it is moved by electrically operated overhead conveyors. These can pick the plate up, turn it over and will transfer it to the tables at the shears. There are three of the latter, one 100 in. one 110 in. and one 132 in. Two 5-ton traveling cranes over the shears are used for loading and shipping.

A very complete testing laboratory forms a part of the plant.

The Life of Rails in Tunnels.

In one of the volumes of Abstracts from Foreign Periodicals, published from time to time by the Institution of Civil Engineers, we find note of an article by Mr. A. Hauet, published in the *Revue Générale des Chemins de fer*, November, 1893, regarding some observations of the wear of rails in tunnels. The rails under consideration were withdrawn after 11 1/2 years of service in a tunnel 984 yds. in length, and the results of the wear given are the mean of the wear of 250 rails so withdrawn.

The tunnel referred to is straight, with an inclination of 1 in 100, is ventilated by two shafts 66 ft. in height, and receives a little water by percolation. The rails have double symmetrical heads, weighed originally 78 lbs. per yard, and were 8.74 yds. in length, with 10 sleepers to each rail. They were composed of soft steel. The sleepers were of beech, creosoted, the majority of which were still in good condition after 11 1/2 years of

service. Seatings, about 1/8 in. deep, were made in the sleepers to receive the chairs. The ballast was composed mostly of gravel.

The rails have supported the passage of 230,000 trains, the speed of which did not exceed 19 miles an hour. The original weight of the rail-length was 682 lbs.; after use its weight was reduced to 518 lbs., thus losing 164 lbs., or 18.76 lbs. per yard. It was found that the vertical projection of the rail-length had acquired a regular convex curvature with an offset a. the centre of 0.0078 in.

The author states that the loss of metal is due to the following causes:

- 1st. Oxidation, about 11 lbs. in the rail-length.
- 2d. The wear on the bottom table of the rail, from 13 to 18 lbs., and which is about 1/8 in. in depth at the extremities of the rail, becoming less toward the center.
- 3d. The impression of the jaws of the chairs.
- 4th. The contact and friction with the fishplates under the head. This, the author states, is more apparent when the Vignoles rails are used.
- 5th. Finally, and most important, the rolling of the wheels on the top table, combined with the rust which is formed during the time elapsing between the last train in the evening and the first in the morning. This accounts for a loss of 132 lbs., or 11 1/2 lbs. per year, and gives to the head a smooth surface of uniform breadth with a regular convexity. The wear is generally greater at the extremities than at the center.

Master Mechanics' Association Apprenticeships.

The examination of candidates for the scholarships of the Master Mechanics' Association will begin at Stevens Institute of Technology, Hoboken, N. J., at 9 a. m., Sept. 16. Any candidate wishing to be examined in Chicago will receive directions as to time and place to attend on forwarding \$10 to President Henry Morton, of Stevens Institute. This fee is to cover the expenses of such an examination.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

We print elsewhere an abstract of the new scheme for the reorganization of the Erie system, which has been awaited with much interest since it was known that the Messrs. Morgan had undertaken to prepare a definite plan. The circular issued by Messrs. Coster, Fitzgerald and Thomas, as the Purchasing Committee, under the auspices of these bankers, will be found to be one of the most lucid in statement which has yet appeared, and it is accompanied by an agreement with the security-holders which may serve as a model for the grant of powers to all future committees. As for the plan itself, it will be seen to be a bold and broad-minded one, which meets the difficulties which have always beset the Erie, in a frank and statesmanlike manner. The Erie has heretofore been an incongruous bundle of distinct corporations with separate interests, which it is now proposed to unite under one ownership, from New York to Chicago. The committee has had the courage, never shown before in connection with this corporation, to "scale down" the securities to be issued by the new company to a point of apparent safety, based upon the past earnings of the several companies, out of which the new Erie is to be created, so that they shall be securities in fact as well as in name. At the same time provision is made for a fair sum to be used for immediate betterments and a further sum for future requirements; all of which promises to make the Erie a first-class road and place it among dividend-paying properties; and constitutes another bond for peace, at which the other trunk lines should rejoice. Those who have noticed the remarkable administrative success of the Erie during the past ten years will not doubt the ability of its management to secure all the benefits possible from the new means which this plan will place at its disposal, for there could be no better training than that which the Erie officials have had in the school of adversity. It will surely be a satisfaction to the American public to see this really great system of railroads placed upon a footing where it may become a benefit to its owners as well as useful to its patrons, and this is what we shall expect to see if the new plan of reorganization is adopted and carried out.

The race to Scotland, which the English railroads have been engaged in for the last two months, and which we have noted in our last two issues, became so exciting last week that the speeds were telegraphed to this country, and on Friday the contest culminated in a run of 540 miles in 512 minutes by the West Coast line, this line thus coming off victor. The correspondents say that no further attempt will be made to shorten the time. As the reports by cable are very brief and unsatisfactory we cannot trace the course of the successive changes in the record, but we may note the two final runs. The best run noted in our previous reports was that of July 30, on the West Coast line, at 54.09 miles an hour through from London to Aberdeen. Now the cable tells us that on August 22 the East Coast train arrived in Aberdeen at 4:40 a.m., and the West Coast train at 4:55. The West Coast people could not endure this humiliating record, and on the

night of the 22d their train left London at 8 o'clock and arrived in Aberdeen at 4:32 the next morning: 540 miles in 512 minutes, which is equal to 63.28 miles an hour. The train was run through from London to Carlisle, 299½ miles, without a stop, and for a distance 32 miles south of Carlisle the speed averaged 74 miles an hour. No other particulars are given, except that the train consisted of only four cars. It will be remembered that the London & North Western has been using for these trains an engine, not very heavy, with four driving wheels 78 in. in diameter, and that with a load of 112 tons a distance of 58½ miles was traversed in one hour, where the grade was 16 ft. per mile, ascending, for most of the way. It is probable that the four cars which made up the train on the final run weighed even less than this.

The principal newspapers of this country have, of course, been greatly interested in these reports and have commented upon them at length. The most noticeable feature of their comments is the anxiety manifested to show that this excellent record of the English roads is no great shakes after all; that they have not beaten us, and, anyway, if they have, we can turn around and beat them if we have a mind to. There is no occasion for this anxiety. For the entire run there is nothing in American records with which to make a fair comparison; but this lack is for well-known reasons, which are not discreditable. The fast trip made by the New York Central on Sept. 14, 1891, was over a course 104 miles shorter, and the train was, without doubt, considerably heavier. Moreover, only one trial was made at that time, the object of the experiment being accomplished the first day. It was not an attempt to make the very highest speed possible. The regular runs of the Empire State express over the Central are subject to similar qualifying conditions. The Exposition flyer of 1893 is the only regular train that has ever been run in America which could be compared with the English runs for so great a distance as 540 miles; but the Exposition flyer was a heavy train, weighing about 200 tons, and much of the time over 236 tons, exclusive of the engine. The fast run from Jacksonville, Fla., to Washington on Aug. 26, 1894 (49 miles an hour) while a highly creditable performance for the roads which made it, is not to be compared with trips over double track lines perfectly signaled.

If there were any legitimate reason for strife between English and American railroad men, newspapers or betting men, concerning the speed record, it would be found, of course, mainly in the differences in the construction or management of the locomotives. All other conditions are either such as cannot be changed or else are mere questions of money. An illustration of this is seen in the fact that the most favorable course for fast running in America, the New York Central, is hampered by a whole mile in Syracuse where the speed has to be reduced to eight miles an hour, not to mention several other similar hindrances of less consequence. The bearing of cost is seen in the statement that the London & North Western made all other passenger trains clear the Scotch express 15 minutes and suspended night freight trains entirely. If this latter statement is even partly true it means a heavy loss. To compare locomotives we must have full details, weight of train, etc., and the profile of the whole line. The best speed mentioned in the English report, 32 miles at 74 miles an hour, falls considerably short of the record made by the Camden & Atlantic on April 21 last from Camden to Atlantic City, N. J. This Atlantic City run was made by an engine with 78 in. driving wheels. If our American editors who are inclined to feel chagrined at these new English records wish to compare mere speed figures they should emphasize this performance. The whole run of 58.3 miles was made in 45½ minutes, equal to 76.46 miles an hour; and a distance of 49.8 miles was covered in 37½ minutes, or at the rate of 79.7 miles an hour.

Some interesting points about distant signals may be found in a paper lately read at Philadelphia, by Mr. G. H. Paine, and from which we reproduce extracts in another column. His recommendation that many signals be moved farther back is unquestionably sound; and we are glad to see that in specifying the distance, he takes a conservative position. The New York Central, with its very fast trains, places many distant signals half a mile or more from the home signal, but it does not follow that such a long distance should be universally adopted. The engineman of a slow train, especially if he is using steam, may think of a good many things in going half a mile, and even may have occasion to shut off and re-apply steam two or more times; this may tend to make him less regardless of the indication of the distant signal. Again, the longer the time occupied by trains in traveling from

the distant to the home signal, the greater the temptation of the signalman to throw the latter to danger after a train has passed the former. In this connection Mr. Paine's reminder of the use in New England of electric locks to preserve to an approaching train the right to a clear track, after that right has once been given to it, is timely. Mr. Paine's long service with the oldest American manufacturers of interlocking should qualify him to make very intelligent choices where rival signal devices are nearly equal in merit, and his expressions of preference are, therefore, peculiarly interesting; but we note that, although he follows a sound theory concerning the principal color for the face of a semaphore blade, he mentions no theory at all concerning the color of the back of a blade. Why not make this gray or drab, or some other indistinguishable color? In condemning the toleration of dirty and inconspicuous signals, noticeable almost everywhere, Mr. Paine uses an argument often carelessly used by all of us, no doubt, which ought to be thrown aside because of its weakness. He says that such signals are obscure to the unpracticed eye. But the very reason why many managers rest easy with poor signals is that they have unbounded confidence that their trains will never have to be run by the aid of any but practiced eyes. Talk about the other kind of eyes, when addressed to the managers, has no weight. The feeling among enginemen that no encouragement should be given to a signal or to anything else that will enable men with unpracticed eyes to run locomotives, sometimes has its influence, no doubt, in decisions of signaling questions. The slowness of the progress made by the movement to abolish white lights for all-clear signals at night probably is due, in large measure, to dependence upon practiced eyes. The best enginemen can run successfully with the most perplexing signals. This white light reform is demanded, however, even if we assume that the unpracticed eyes have all been frozen out; and its friends must lay stress on those arguments in its favor which are not affected by the practiced or unpracticed condition of the enginemen's eyes.

A Proposition to Abolish Excursions.

The wreck of an excursion train this summer led to various comments from the daily newspapers, one of which, by the Philadelphia Press, we took occasion to criticize. The Press, however, does not feel like accepting our arguments, and reiterates its views.

The main question emphasized was a matter of detail in describing discipline. We did not disagree on the essential point that collisions are generally caused by a failure of discipline. The error in the position taken by the Press is in assuming that discipline which is good in ordinary times suddenly becomes bad when men have to undertake unusual work, such as running an excursion. The real trouble is that in cases of accident it is nearly always discovered that the discipline has been defective all the time. The cases in which very bad accidents are caused by a good man, well disciplined, who makes one of those slips which we all recognize as due to ineradicable weaknesses of the human mind, are exceedingly few and far between; so much so that it is hard to recall one. Even the Craig's Road case seems likely to prove less mysterious than the first accounts indicated, for the verdict of the coroner's jury brings out the fact that the engineman bought a quart of beer and took it with him on the engine at Arthabaska, a few miles back of the place where the collision occurred. There are times when even a pint of beer will make a man sleepy. The Missouri Pacific, in warning its men not to drink intoxicating liquors, mentions beer as one of them, thus guarding against the fallacy held by many men, that beer contains too little alcohol to do any harm.

But the main point on which we differ with the Press is that in regard to the expediency of running excursion trains at all. As such trains get run into, and as when such an accident occurs it is likely to be very fatal, like Mud Run and Jackson, the Press would abolish them, and run only regular trains. It argues that the extreme reductions of fare which draw out such crowds are uneconomical, that a uniform reduction of regular fares, to an equal amount in the aggregate, would be better for the public, and that the absurdity of the whole thing may be seen by comparing the excursion policy with the customs of the freight department. "Imagine," says the Press, "the effect of the announcement that for thirty days freight would be carried to Boston, if billed via Christian Endeavor warehouses, at half rates! Imagine the jam of cars, the tax on facilities, the strain on rolling stock, the peril of accident, and, worst of all, the demoralization of rates!"

We are sorry to spoil the prettiest paragraph in our contemporary's article, but the fact is that this is just what does occur in the freight department very fre-

quently. It is not necessary to imagine it. If the editor of the *Press* will ask any of his railroad friends he will find that carrying freight at half rates is a pastime that has been indulged in hundreds of times and that it does produce the jams and strains and demoralization just as he imagines. But it does not increase the peril in undue proportion, except where it is continued long enough to lead to the employment of too many green men, because the discipline in the freight train service is more nearly up to the requirements.

But freight trains aside, the question is whether we ought to forego all picnics, boat races, Grand Army reunions and Christian Endeavor conventions because we cannot get to them on regular trains (for we could not); and as a finality on excursions, the *Press* asks, "has the *Railroad Gazette* any doubt that this is both a wasteful and a dangerous way of doing business?"

Yes, we have several doubts. As before intimated, the danger to life and limb is not incurable; but as our readers must know our views on that point pretty well we will not now enlarge upon it. As to the wastefulness of excursions, when reasonable safety is assured, our critic need look at only two facts. The average number of passengers carried per train in the United States is not over 50 (42 in the last Government report). At 2½ cents a mile this brings in only \$1.25 per train mile, which leaves a pretty small profit from which to pay the stock and bondholders a fair income. The average train has seats for, probably 200 to 250 passengers, leaving from 588 to 208 empty. This is inevitable, if the fluctuations from day to day are to be provided for. The ordinary passenger train is not a very profitable establishment and many such trains are actually unprofitable. There is hardly an important road in the country that does not run some non-paying passenger trains.

On the other hand, the average number of passengers carried per excursion train is probably between 200 and 500, certainly many times more than 50. Whatever the number, the main desideratum, full train loads, is assured. With expenses only slightly increased, the railroad manager, by getting five or ten times as many passengers to a train, can increase his profits greatly, even at reduced fares, and the public reaps the incidental advantage that in cultivating this business the manager provides himself with an ample supply of cars, so that at all ordinary times he has an abundance. A train-load of 400 passengers at half a cent a mile, less than one-fourth the average rate, brings in twice as much money per train mile as 50 passengers at 2 cents a mile, and the increase in expense is very small, probably less than 25 per cent.

The only question of economy is whether it is right to thus induce people to travel when it may be argued that they do not want to. Probably there are traffic managers who would continue to advertise excursions for the sake of showing a record of large traffic, even if they found that the reduced rates took too many people who would have made the same trip without the reduction; but these must be very exceptional, and we cannot believe that the excursion business generally is bad for the railroads, for if excursion trips did induce people to stay at home too persistently the rest of the year, the traffic managers would run fewer instead of more excursions. And the pleasure trips must be satisfactory to the passenger, else the business would not increase from year to year.

In fact, the idea of ceasing for commercial reasons to run low-fare excursions violates some principles which seem to have become fundamental. One is that of creating traffic. This is the first great lesson taught by the well-trained traffic manager to his subordinates—not to steal the other man's business, but to make new business. Having certain freight or passenger business moving now at regular rates, how and where can you reduce rates so as to make new business move and still not interfere with existing traffic and rates? A uniform reduction of fare would not answer the same purpose at all. It would not draw out much traffic that otherwise would not move; nor would it fill the trains so full as to permit constant expenses to be divided among a greater number of fares. The railroads do not make the thousand and one gatherings of masses of people; they are largely the product of the wish of these people to get together, and of merchants and hotel keepers that they should get together. It is good policy in more ways than one for the railroads to serve these various classes.

And finally, is it not a little absurd to assume that the railroad as a machine is only fitted for routine work; or that its maximum possible product can be its average product; or that it must never be speeded up for fear something will break? The railroad is no such delicate machine as that.

The Liberty Park Collision.

A rear collision of passenger trains occurred at Liberty Park Station, Camden, N. J., on the Camden

& Atlantic Railroad, on Aug. 15, killing one passenger, the causes of which should be carefully noted by all American railroad superintendents. The train run into was a heavily-loaded excursion train and the collision occurred while it stood at the station, about eight o'clock in the evening. Regular train No. 260, following the excursion, passed the last block signal station, which was at Collingswood, under a signal wrongfully given, and ran into the excursion train with such force as to crush the rear car for about 6 ft. Most of the passengers succeeded in getting to the front end of the car, but about 30 of them were slightly injured. The signalman at Collingswood mistook a report of another train, passing another station, which was being transmitted on the train wire from Camden, for a report on the block wire from Liberty Park; and, acting on this wrongful assumption, allowed train 260 to pass. The flagman of the excursion train appears not to have gone back at all, having devoted his time to getting passengers out of the cars.

An officer of the road informs us that both the signalman at Collingswood and the rear brakeman of the train were experienced men, the record of the former, especially, being spoken of as excellent. The first place to look for the trouble, therefore, is in the system, and we find it without going far. Any English signalman would point out one sufficient cause for it with his eyes shut. As many of the most valuable things that we know concerning non-automatic block signaling were learned from England, the Englishman's views in this case are entitled to great respect. He would tell us that the fatal defect was the lack of a visual signal on the telegraph instrument in each block-signal cabin, a separate signal for each wire and a wire for each track. Possibly the English may not deserve any special credit for devising visual signals for this purpose, for the use of the needle telegraph, which grew up in England contemporaneously with the Morse telegraph in America, naturally led to such a result; but it is quite possible that we may deserve discredit for not adopting an apparatus which is better than ours, as soon as we have its superiority plainly shown. It is unnecessary to present arguments on this point, for American signal engineers have studied the Sykes apparatus enough to see the advantage of a telegraph instrument which at all times shows the condition of the section of track to which it refers. It is sufficient to say that the expense for visual instruments need not be greater than for Morse. The change from Morse would be somewhat radical, but it would not involve anything difficult for the signalmen to learn. It is true that in abandoning Morse an American superintendent would naturally wish to adopt the full lock-and-block—the Sykes with all the latest and best improvements, which are somewhat costly—but this must not obscure the main point, that the simple change from an audible telegraph to a visual is inexpensive.

But it is only fair to say, in justice to the common American practice of depending on an audible telegraph, that the operator at Collingswood seems to have neglected the simple precaution of repeating the signal before acting upon it. Whether such repetition is required by the rules of the railroad company we do not know. Repetition (or an acknowledgment which is practically unmistakable and answers the purpose of a repetition) is prescribed in the Sykes bell codes and is such a well-known precaution that it seems strange that an experienced and intelligent signalman should take chances in the manner reported in this case. It would be interesting to know whether he used the same sounder for both the block wire and the train wire. In the English standard code of block signal rules (printed in the *Railroad Gazette* of June 14 and 21, 1895) the repetition and acknowledgment of signals is prescribed at the very outset (Rule 2) and signals are not to be considered as understood until they have been correctly repeated. On the Great Northern of England, where a special form of dial apparatus is used, the rule goes still further, and requires that A give to B an acknowledgment that the repetition is correct.

At the inquest on this collision, held before Coroner Justice, at Camden, Aug. 21, the jury brought in a verdict throwing the responsibility for it upon the Collingswood signalman and exonerating the trainmen from all blame. Many railroad officers will say that Mr. Justice has accepted a verdict which belies his name. They will say that the exoneration of the brakeman was unjust, for his rules require him to go back and stop following trains regardless of all block signal rules. If we may judge by the rules printed in the official codes, this brakeman will be held culpable by every railroad manager in England and America. And yet this verdict, rendered by a jury of ordinary citizens, is exactly in line with the views of the highest experts, the Inspectors of the British Board of Trade, who are not only well-trained engineers, but men of long experience in dealing with railroad collisions.

They have reported on numerous collisions where the brakeman could have taken preventive action as well as it could have been done at Liberty Park, and where the rules required the flagging to be done, the same as it is required here, and yet have uttered no word of censure either for the brakeman or the conductor. There is at least a fair presumption that this coincidence of view is not accidental, but the result of the application of plain common sense in both cases.

It seems to be seen on all sides that the flagging rule is of questionable value. It is discredited both theoretically and practically. As we have many times shown, efforts to perfect the rule and make it fairly workable on busy roads have always come short of success. It cannot be consistently enforced. But if there were no fault with the rule there still remains the fault with the men. Knowing that the block signal rules are in force they will place dependence upon them. The expert English inspector and the plain citizen of New Jersey seem to agree that, in this matter, as in the case of another question of discipline referred to in these columns Aug. 16, in connection with an Ohio railroad, it is the part of wisdom to prescribe only such rules as can be enforced.

The Financial Condition of the Norfolk & Western.

We have now at hand most of the facts which bear upon the present condition of the Norfolk & Western and indicate the possibilities of its reorganization. The expert accountants who have been working over the company's books for the bondholders' committees, have submitted a very complete report, which is quite a model document of its kind. Their financial survey is complete to the end of 1894, and thus covers the period of these three years which brought this road into the hands of Receivers. In view of the large deficit at the end of 1893 it is remarkable that the company kept its head above water so long.

Taking the gross earnings and expenses of the last three years we have the following showing:

	1894.	1893	1892.
Gross earnings.....	\$10,611,036	\$10,255,200	\$13,112,470
Expenses.....	8,067,731	7,528,675	7,323,420

Net earnings..... \$2,543,305 \$2,726,525 \$2,789,050

In the meantime the fixed charges have increased very heavily, reaching these figures: For 1894, \$3,419,786; for 1893, \$3,269,547; for 1892, \$2,749,342. Deducting these from the net earnings after adding certain minor earnings from investments, the results show a severe falling off for this period:

	1894.	1893.	1892.
Deficit \$710,895 Deficit \$427,573 Surplus \$265,872			

A closer study of the various accounts throws light on the causes which have occasioned this loss. As above stated, gross earnings have increased moderately in the three years, while, by pretty strict economy, the expenditures show no very large average increase, although there is a considerable advance in '94 after the sharp curtailment for the panic year of '93. The result is that the loss in net income is small, amounting to no more than \$50,000 in 1893, and less than \$200,000 in 1894. This showing is in marked contrast with the experience of most of the roads which suffered heavily in these two years.

The trouble with the Norfolk & Western came from the sharp increase in the fixed charges. The interest on the funded debt increased \$300,000 in 1893, and \$200,000 in 1894. The interest on car trusts increased \$125,000 in 1893, while the interest which the company was compelled to pay on securities of leased lines which it had guaranteed rose from nothing at all in 1892 to \$233,000 in 1894. The leases of the Roanoke & Southern, and Lynchburg & Durham Railroads have proved an unfortunate undertaking in the face of the hard times. It is a well-known fact that such branch lines recover very slowly from a period of depression, so that the present company will have to bear a considerable burden from this source for a year or two—a fact to be considered in any plan for reorganization.

One main consideration in the estimates of the cost of reorganizing such a railroad property is the present physical condition of the road. Most railroads are in a pretty poor condition physically by the time they are actually driven into the hands of the receivers. For every device of economy is always practiced in this field, a policy which merely postpones the evil day and is cumulative in its bad effects. The results of this policy are the principal causes of the almost universal experience that receiverships and reorganizations are so much more costly than the amplest previous estimates would indicate. But the Norfolk & Western is fortunate in showing a very satisfactory physical condition after such a period of financial difficulty. This is best shown by the steadiness with which expenditures for maintenance of way and rolling stock have been kept up, indicating only a moderate curtailment in '93 and a much larger outlay in '94. The expenses in these lines were: In 1892, \$3,151,790; in 1893, \$3,031,806; in 1894, \$3,581,829.

An instructive item in the rolling stock account is an adjustment of \$688,331 made by the company in closing its books to Dec. 31, 1894, as an allowance for depreciation in value. The expert accountants found that a further amount of \$300,000 should be added, as a charge for the excess of equipment destroyed over the equipment replaced during the last three years. This accordingly has been added in their report to the

expense account of the company, and is included in the figures of the expenditure for the three years given above.

Another misleading feature in the accounts of the company has been very properly corrected in this accountants' report. The deficiency in the revenue of leased branch lines to meet their own fixed charges, representing the sums which the Norfolk & Western has been compelled to advance by reason of its guarantees, has been hitherto placed to the debit of these subsidiary companies, and carried on the books of the main company as a realizable asset. This is still a common practice in railroad accounting, though every one knows that it is thoroughly unsound and misleading. It has naturally been transferred to the debit side of the net income account with the ordinary fixed charges of the company, and, with them, is deducted in our estimates from the net earnings. Any other method of statement can hardly be justified.

The present report shows therefore the presence of a greater loss than was previously estimated, but it also shows that the property is in good physical condition. On the whole the outlook for a quick and successful reconstruction is favorable. One very unfortunate fact is added to the situation by this summer's strike of miners, which has lasted so long and has cut down earnings badly. The loss from this cause in July alone was over \$70,000, and this, it must be remembered, is in the face of general business revival. Returns for the first seven months of this year show a loss of \$329,085. The effects of this strike are, of course, temporary, and outside of this there is every indication of returning prosperity bringing large increase of earnings, but the losses from this source have been enough to perceptibly increase the cost of immediate reorganization.

July Accidents.

Our record of train accidents in July, given in this number, includes 33 collisions, 52 derailments and 3 other accidents, a total of 88 accidents, in which 25 persons were killed and 76 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

	Rear.	But-ting.	Cross-ing and other.	Total.
COLLISIONS:				
Trains breaking in two.....	5	0	1	6
Misplaced switch.....	0	0	1	1
Failure to give or observe signal.....	3	0	1	4
Mistake in giving or understand-ing orders.....	0	3	1	4
Miscellaneous.....	1	0	3	4
Unexplained.....	3	2	10	15
Total.....	12	5	16	33

DERAILMENTS.				
Broken rail.....	1	Derailing switch.....	2	
Defective bridge.....	2	Animals on track.....	1	
Broken wheel.....	1	Landslide.....	2	
Broken axle.....	3	Washout.....	3	
Broken truck.....	1	Malicious obstruction.....	3	
Failed brakebeam.....	1	Accidental obstruction.....	2	
Failure of drawbar.....	1	Unexplained.....	19	
Misplaced switch.....	4			
Total.....	16			52

OTHER ACCIDENTS.

Boiler explosion.....	1
Cars burned while running.....	1
Other causes.....	1
Total.....	3

Total number of accidents..... 88

A general classification shows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.	p.c.
Defects of road.....	0	3	0	3	3
Defects of equipment.....	6	13	1	20	23
Negligence in operating.....	12	6	2	20	23
Unforeseen obstructions.....	0	11	0	11	12
Miscellaneous.....	15	19	0	34	39
Unexplained.....	3	2	10	15	17
Total.....	33	52	3	88	100

The number of trains involved is as follows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.
Passenger.....	12	14	1	27
Freight and other.....	45	39	2	86
Total.....	57	53	3	113

The casualties may be divided as follows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.
Killed.				
Employees.....	5	11	0	16
Passengers.....	1	0	0	1
Others.....	1	7	0	8
Total.....	7	18	0	25
Injured.				
Employees.....	24	23	1	48
Passengers.....	16	3	0	19
Others.....	1	8	0	9
Total.....	41	34	1	76

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	0	0	7
Defects of equipment.....	0	0	2	4
Negligence in operating.....	1	19	6	24
Unforeseen obstructions and maliciousness.....	0	0	1	5
Unexplained.....	0	0	5	8
Total.....	1	19	16	48

Nineteen accidents caused the death of one or more persons each, and 23 caused injury but not death, leaving 46 (52 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with June of the previous five years shows:

	1895.	1894.	1893.	1892.	1891.	1890.
Collisions.....	33	61	89	83	73	84
Derailments.....	52	75	87	104	91	59
Other accidents.....	3	12	5	5	5	6
Total.....	88	148	181	192	169	149
Employees killed.....	16	43	38	29	29	47
Others killed.....	9	21	22	16	68	23
Employees injured.....	48	95	79	77	91	116
Others injured.....	28	55	97	73	121	133
Passenger trains involved.....	27	69	55	82	67	64

Average per day:

Accidents.....	2.81	4.77	5.81	6.19	5.45	4.81
Killed.....	0.81	2.06	1.87	1.45	2.97	2.26
Injured.....	2.15	4.56	5.63	4.81	6.84	8.03

Average per accident:

Killed.....	0.281	0.132	0.330	0.231	0.514	0.469
Injured.....	0.854	1.913	0.972	0.781	1.254	1.672

The record for July is much more favorable than that for the same month last year. In the case of the one accident, a collision, in which a passenger was killed, a coroner's jury returned a verdict of "accidental death and no one to blame." The engineer who failed to control his speed testified at the hearing that "the track was so slippery that he could not stop his train."

There were two bad bridge accidents in July, though the most spectacular one, that near Monument, Col., would not have killed anyone but a tramp if there had not been men at work beneath the bridge. This trestle bridge was 50 ft. high at the highest point, and 300 ft. long, and it took a week to restore the part which was destroyed. No explanation has been given except that the bridge was seen to sway before the crash occurred. The train was running at moderate speed and there was no derailment before the bridge gave way. A coroner's jury found that "the bridge has been for a long time in an unsafe condition," but how much sound basis there is for this statement, we do not know. The cause of the other bridge failure, near St. Charles, Mo., is equally shrouded in doubt—so far as the public is concerned.

There were a number of cases in July of distortion of track by solar heat, and in one case, near Emporia, Kan., it is stated that a passenger train would have been derailed in consequence of the displacement of a rail by this cause, but for the fact that when the rail was sprung out of place, it made such a loud noise that a gang of trackmen heard it and flagged the train.

The very bad collision at Craig's Road, Quebec, on July 9, does not appear in our record, having occurred outside the United States. The details, so far as known, were reported in the *Railroad Gazette*. The theory that the engineer and fireman were both asleep at the time of the collision still remains substantially unimpaired, though one engineer testified at the hearing before the coroner, that the position in which the dead engineer's body was found indicated that he may have taken several steps toward the outer edge of the tender (the gangway) with the intention of jumping off. No additional light has been shed upon the engineer's negligence, except in one point; the jury reports that he bought a quart of beer at Arthabaska, some miles back of the point of collision, and took it upon the engine with him.

Electric street-car accidents of all sorts occurred in July, although we find only three cases in which such cars were mixed up with standard railroad trains. Near Niles, O., on the 7th, one was struck by a locomotive and one passenger was killed and five injured. At South Camden, N. J., a trolley car was stalled on a crossing by reason of the pole slipping off the wire. This accident happened in the night as a train was approaching, but the passengers all escaped. The car was wrecked. There was a similar accident at Thirty-first street, West Philadelphia, on the 24th, but no one was hurt. A rear collision of electric cars happened near Columbus, O., on the 4th; a butting collision near Middletown, N. Y., on the same day, and a crossing collision in Philadelphia on the 25th. The first is said to have been due to the negligence of a conductor in stopping in the middle of a block, contrary to orders. He did this to accommodate the wife of one of the road's officials. The crossing collision is attributed to the breaking of a brake chain. There were five derailments, in which 30 or more passengers were injured, and in one of which a motor-man was killed. One derailment, near North Bergen, N. J., was due to carelessness in pushing a construction car ahead of a motor. Two others were due to the very general cause of cars becoming unmanageable, and one, on the new pleasure railroad from Niagara Falls to Lewiston, is said to have been due to the use, as a trailer, of an old street railroad car, the wheels of which were not suitable for high speed.

At Pottsville, Pa., on the 23d, 50 passengers jumped off from a runaway electric car and many of them suffered minor injuries, but the car was controlled and stopped in safety. At 129th street and Amsterdam avenue, New York city, on the 28th, a cable car ran away on a steep grade, the grip having broken. Four passengers were injured. Near Williamstown, Mass., on the 21st, a wagon was struck by an express train of the Fitchburg Railroad and four of its six occupants were killed.

Official announcement was made last July that a new passenger tariff would take effect on the Austrian State Railroads Sept. 1. Certain railroads owned by private companies and worked by the state will continue to have the old tariff. The bases of the rates of the new tariff are, (retaining Austrian measures to show the plan) as follows for ordinary passenger and mixed trains in *Kreutzers* per kilometer:

	Class 3.	Class 2.	Class 1.
1 to 150 kilometers.....	1.25	2.25	3.75
151 to 300 ".....	1.15	2.15	3.65
301 to 600 ".....	1.01	2.00	3.50
Over 600 ".....	0.80	1.80	3.30

Thus, for all distances, the second-class rate per kilometer is 1 kreutzer higher than the third-class rate, and the first-class rate $2\frac{1}{2}$ kreutzers higher = 0.773 cent, and 1.932 cents per mile more for the second and first than for the third class. The latter for 93 miles or less is 0.966 cent; for additional miles up to 186, 0.889 cent; for additional distances up to 378 miles, 0.773 cent; for any additional distances 0.62 cent. A third-class ticket for 900 miles = 1,449 kilometers, thus would cost in kreutzers: $(150 \times 1.25) + (150 \times 1.15) + (300 \times 1.00) + (849 \times 0.80) = 13$ gulden, 39 kreutzers = \$6.43; while \$13.39 will be charged for a second-class and \$23.31 for a first-class ticket. The charges are made by zones of 10 kilometers, so that it costs as much to travel 71 as 80 kilometers. For fast trains (which are mostly not very fast) third-class passengers pay an additional charge of half a kreutzer per kilometer, second-class passengers 1 kreutzer and first-class passengers $\frac{1}{2}$ kreutzer per kilometre. This would make our 900-mile journey cost \$9.91, \$20.34 and \$33.74 respectively. In addition, all tickets have a stamp tax equal to 1 kreutzer for every 50 kreutzers of the price of a ticket, but not exceeding 25 kreutzers (12 cents) for any ticket.

Yearly season tickets are issued for all lines at the price of \$72, \$144 and \$216 for the three classes, and there are some other commutation rates. In the following cases the new rates are reductions: Children from 4 to 10 pay half rates; pupils attending public institutions of learning at distances not greater than 50 kilometres (31 miles) from their homes also get half rates, and a similar reduction is made to workmen and women, apprentices, miners and day laborers of all industrial enterprises, for journeys of 31 miles or less, in third-class cars, on ordinary or mixed trains.

The half-fare rates from all over the country to Boston for the Knights Templar conclave this week appear to have produced the worst demoralization in the passenger business that the railroads have experienced this year. As early as Wednesday of last week it was said that the Chicago railroads had begun to relax the restrictions, and practically all limits as to signatures and stop-overs were soon reported as thrown aside by all lines. Passengers were allowed to begin the return trip by some roads before the conclave began, and the suspension of the signature requirement permitted the journey to be terminated at New York about as readily as at Boston. The scalpers reaped a rich harvest on all sides, and tickets from New York to Boston were advertised at \$1 each. Coincident with this it is reported that the Baltimore & Ohio has been paying such large commissions on other through business that the Pennsylvania has seriously threatened to reduce the one-way rate from New York and Philadelphia to Chicago from \$20 to \$9. The reporters say that the New York Central is the only road which has maintained the conditions of the agreement on Boston excursion tickets.

The long-pending litigation concerning the affairs of the Baltimore & Ohio Relief Association is said to be drawing to a close. This association, started in 1880, was disbanded in 1889, the Maryland Legislature having, at the request of a very few disaffected members, passed a law dissolving the charter. The railroad company then established a "Relief department," and nearly all the members of the association went into it; but there was a considerable amount of money in the treasury, and there has been a long dispute in the courts about the basis on which this should be distributed. The auditors appointed by the court, who have now filed their report, award \$548,399 to the railroad company, in trust for the members now in the Relief department, and the remainder of the fund, \$22,875, goes to the members who stood out; but there must first be deducted from this the sum of \$7,500 for counsel fees. This litigation has been before the Court of Appeals three times. From May 1, 1880, to June 30, 1895, the Association, and its successor, the Relief department, paid out over \$4,000,000 in benefits, including \$908,690 for 1,989 cases of "natural death."

NEW PUBLICATIONS.

The Mineral Industry, Its Statistics, Technology and Trade in the United States and Other Countries. Vol. III. Edited by Richard P. Rothwell, editor of the *Engineering and Mining Journal*. New York, The Scientific Publishing Company. 110 + 770 pages. Price \$5.

We need not tell our readers of the value of this volume. It has spoken for itself in its two previous editions, and has made an enviable reputation for accuracy and completeness. The material of the work is largely drawn from statistics collected in the office of the *Engineering and Mining Journal*. The number of subjects treated is very large, as is indicated by the 12,000 separate titles given in the index. The occurrence and character of mineral deposits, the methods of mining and treating ores, cost and uses of metals and minerals, review of the mineral, metal and mining stock markets, and many other similar subjects are ably treated. Valuable features of the book are the technical articles by well-known authorities giving recent progress in each department of mining, metallurgy and the chemical industry.

The value of a book of this sort is particularly appa-

rent to those most interested in the subjects treated, but as a reference book it should have a place in every technical library.

TRADE CATALOGUES.

The Hunt Air-Brake Co., Pittsburg, Pa., has issued an instruction book for the guidance of motormen and conductors in the maintenance and handling of the Hunt air-brake apparatus, which is used on street cars. This brake is non-automatic, or "straight-air." The book shows not only the way to handle the brakes, but also gives descriptions, with diagrams, of the machinery, going into details very fully. The book seems to have been the work of a careful writer.

Fly Wheels, etc. The Philadelphia Engineering Works, Philadelphia, Pa.

We have received three pamphlets from this company, treating of fly wheels, condensing and non-condensing engines applied to rolling mills, and rules and tables for equalization of power developed in the cylinders of compound engines. The latter are put in especially concise and clear shape for use.

Tobin Bronze. The Ansonia Brass & Copper Co., 19 and 21 Cliff street, New York. 1895.

The tests of this well known metal, given in the small pamphlet bearing the above name, are interesting. While lighter than copper, it has an ultimate tensile strength of 79,600 lbs. per sq. in., and in small wires has given 130,416 lbs. It is adapted for pump piston rods and shafting, commutation segments and a variety of other special uses, including yacht construction. A large number of testimonials are furnished.

Collapse of a Large Chicago Building.

The collapse of the Coliseum in Chicago Aug. 21 is regarded by engineers as one of the worst building failures that has occurred in the West for a number of years. The building was designed by Mr. S. S. Beman in Italian Renaissance style, and was 770 ft. long and 300 ft. wide. It was constructed similarly to the Machinery Hall at the World's Fair, and the roof was to be supported by 14 trusses, each having a span of 218 ft. There were separate foundations for the ends of each truss. These were made by driving 13 piles 35 ft. long, which were bolted together and covered with a concrete

the parts of the various trusses were not securely enough bolted or riveted to withstand the load of roofing material piled on the roof. Other accounts hint at poor foundations. The strain sheets for the roof trusses are now in the hands of an engineer for examination, and it is to be hoped that the blame will be placed where it is deserved.

The Coliseum was provided to seat 16,000 people, and in it spectacular shows, conventions, public gatherings, etc., were to have been held. It covered about 5 acres.

Tests of Metals at High Temperatures.

As is well known, a number of experiments have been made from time to time both in this country and abroad for determining the behavior of different metals when tested at high temperatures. These are valuable partly because of the fact that steam is now being used at much higher pressures than formerly, and consequently the metal of boilers, steam pipes, etc., is subjected to a higher temperature. The results have shown that such temperatures as result from the high steam pressures now used do not materially affect the strength of iron and steel. In fact, some experiments show that they are stronger at temperatures varying between 350 and 540 degs. Fahr. Different results, however, are obtained from tests of copper and various alloys, which tests are practically valuable since copper steam pipes, which have proved perfectly reliable under 80 lbs. of steam corresponding to, say, 324 degs. Fahr., have proved far less satisfactory when this pressure has been doubled, although the temperature was increased perhaps only about 37 per cent. Laboratory experiments have shown a marked decrease in the value of copper after it has been baked for a long time under, say, 400 degs. of temperature. Some experiments which have been made by Mr. A. Le Chatelier and Mr. Stanger, and which are recorded in a recent issue of *London Engineering*, show the strength of hard and soft copper, and various bronzes under varying temperatures. We reproduce some of the results below, the tests by Mr. Stanger being of bronze made by the Phosphor-Bronze Co. Mr. Le Chatelier maintains that thoroughly annealed good copper has a strength of only 10 tons per square inch when tested at 400 degs. Fahr. The results are further valuable in the case of brazed steam pipe joints, and the presence of minute impurities seriously affects the reliability of copper when exposed to high

TESTS BY MR. STANGER.

Material Malleable Bronze.	Temperature.	Breaking Stress.	Elastic Limit.	Extension.	Reduction of Area.
		Tons per sq. in.	Tons per sq. in.	Per cent. on 6 in.	p. c.
Rolled malleable bronze.....	Cold.	31.51	29.19	8.2	61.6
Malleable bronze.	"	28.82	27.54	9.0	71.8
" "	400	27.49	23.42	8.3	68.9
" "	500	26.11	24.70	9.0	67.0
" "	600	25.51	21.39	10.8	62.3

Interchange and Wheel Gages in England.

We are permitted to publish the following letter from Mr. J. W. Emmett, Wagon Department, London & North Western Railway, with regard to the practice of that company in the matter of gaging wheel treads and distances between wheels. We judge that this will be especially interesting to those members of the Master Car Builders' Association who are trying to reduce our own somewhat diverse practice to harmony.

"We give the distance between the tires of the wheels 4 ft. 5 1/2 in., and we do not allow any wheels to come on the railway which do not conform to these dimensions. No latitude whatever is allowed. I may say that so far as this company is concerned we have a gage which drops on the tire, fitting the flange both inside and outside, and all our wheels are made to this gage, and I believe that all the other companies work to a similar gage, no latitude ever being allowed by any of the companies in this country."

The London & North Western specification for the equipment of "private owners' wagons," has the following very radical clause.

"The owners of all vehicles brought upon the railway are required to keep them in good repair and in every respect in good working condition, and to have them thoroughly greased and properly examined each journey, and put in proper working order before leaving, and the tare to be plainly painted on the side of each wagon. If in transit any slight defect should be observed, which for the proper and safe working it is necessary to repair before the vehicles are allowed to proceed further, the company will, with the consent of the owners, make such re-

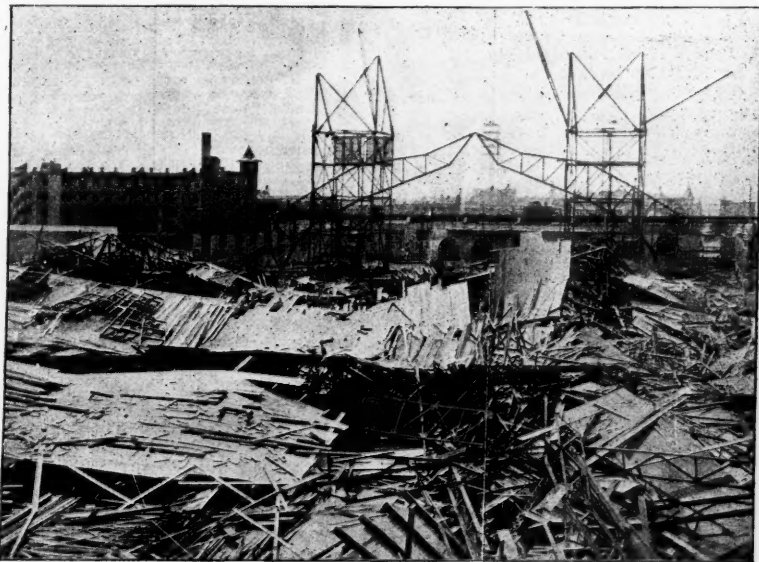


Fig. 1.



Fig. 2.

foundation 12 ft. sq. and 10 ft. deep. On top of this was a cap stone 5 ft. sq. and 20 in. thick, which held the bed plate casting for the end of the truss.

The trusses were designed by Mr. Carl Binder, who also had the sub-contract for the iron work.

The fall of the building occurred at a time when no work was going on and consequently no one was injured. On account of the hurry in the construction, 600 men had been working in three shifts, and from 9:30 p. m. to 3:00 a. m. the only men at the place were two watchmen and an engineer in charge of a hoisting engine. These escaped in time.

Eleven trusses had been placed in position, the last on the south end being still held by the traveling cranes. The roof had been started and there was about 50,000 ft. of lumber piled on it. As nearly as can be now told, the break first occurred in the sixth or seventh truss from the north end. The four extreme northern trusses fell outward to the north, the next three almost directly downward and the remaining three at the south were twisted, their joints at the center going north and their ends south.

Fig. 1 is a view from the northeast, and shows to some extent the lumber and unfinished roof, also the eleventh truss, which, supported by the cranes, did not fall. Fig. 2 shows what was left of a joint at the apex of a truss. The newspaper and other accounts of the accident tell us that the structural steel was not subjected to mill inspection on account of the hurry in the construction, that the strain sheets for the trusses were made and checked only by the contractor, and that the work was so rushed that

temperatures. Concerning alloys, widely varying results were obtained; for instance, from different samples of gun metal. Aluminum bronze, rolled, preserves its strength well, but the castings deteriorate rapidly. Mr. Le Chatelier finds that zinc-copper alloys are much less sensitive to temperature changes than tin-copper ones, and further that the addition of one per cent. of aluminum to brass improves its behavior considerably, making the metal more suitable for boiler fittings than the usual gun metal.

Tests made by Mr. De Volson Wood, results of which were given in a paper at the Detroit meeting of the American Society of Mechanical Engineers, show that there is a slight diminution of strength as a result of stretching iron when hot. If, however, the stress does not exceed one-fourth of the ultimate strength the loss is scarcely more than 1 1/2 per cent. It seems that an increase of temperature affects both iron and steel in a very much slighter degree than it does copper and brass and other alloys.

TESTS BY MR. LE CHATELIER.

Material Copper wire.	Strength at 60 dgs. Fahr.	Strength at 482 degs. Fahr. when the test lasted		
		10 sec.	10 min.	30 min.
	Tons per sq. in.	Tons per sq. in.	Tons per sq. in.	Tons per sq. in.
Hard copper.....	31.75	21.6	15.7	11.43
Soft copper.....	15.9	11.9	11.3	10.4

pairs, and charge them with all expenses incurred in effecting the same; but should an examiner omit or be unable to detect any damage, weakness, or absence of parts, the owners of the wagons will be still held liable for any expenses which may be incurred by accident arising therefrom; and further the owners will be held liable for any damage done to other vehicles, or to property belonging to or in charge of the company, by reason of any accident resulting from improper condition of any of their vehicles, or from their failure; the examination by the company's examiners being made solely with a view to the safe working of their traffic, and by which the responsibility of the owners is not annulled nor in anywise reduced."

What would private owners think of such conditions in this country?

English Railroad Statistics for 1894.

The Board of Trade blue book, giving the returns of the railroads of Great Britain and Ireland for the calendar year 1894, has been issued, and we give below the principal summaries for the United Kingdom. As a matter of interest we have added a column showing certain statistics concerning American roads, which the reader may wish to compare with the English figures. These American items are taken from the introduction to Poor's Manual, which has just been issued, and which is more fully treated in another article. Poor's figures represent totals up to the dates of the respective annual reports of the companies, some of which are to June 30, 1894, some to Jan. 1, 1895, and some to other dates be

tween these two. The English reports do not give either passenger miles or ton miles.

In the table following, all of the money items and the passenger, ton and train-mile items, except averages and percentages, represent *thousands*, the last three figures of each being omitted. In column B we have multiplied each sum of English money by five, to facilitate comparison with items in column C.

	United Kingdom.	United States.
	A.	C.
Miles of railroad.....	20,938	178,054
Stock outstanding.....	\$212,933	\$3,561,680
Debentures.....	\$258,507	\$1,292,535
Loans.....	\$113,845	\$5,605,776
Total stock and bonds.....	\$585,285	\$10,160,308
Passengers carried.....	6,911,113	583,248
Freight carried, tons.....	324,458	675,129
Pass. train miles.....	173,896	327,212
Freight train miles.....	8,691	1,836
Mixed train miles.....	149,440	473,790
Total train miles.....	333,027	813,383
Pass. earnings.....	\$230,862	\$151,310
Other pass. tr. earn.....	\$5,633	\$28,165
Freight earnings.....	\$13,379	\$216,895
Other earnings.....	\$1,436	\$22,180
Total earnings.....	\$251,310	\$1,067,644
Operating expenses.....	\$17,308	\$238,040
Net earnings.....	\$234,002	\$829,604
P. c. expenses to gross earn.....	56	70.4
Locomotives.....	18,328	35,813
Pass. train cars.....	57,661	34,282
Freight cars.....	59,776	1,191,896
Other cars.....	14,303	14,303
Com. stock rec'g no div's.....	\$17,899	\$239,495
Guar. " " ".....	\$105	\$525
Pref. " " ".....	\$13,839	\$69,295

a Bonds.
b Includes unfunded debt.
c Excluding season ticket passengers.
d Including season ticket passengers.

The Railroads of the Cape of Good Hope.

We received a few weeks ago a copy of the Report of the General Manager of the Railroads of the Cape of Good Hope for the year 1894. The system consists of 2,350 miles, 97 miles having been added during the year. The total earnings for the year were £2,713,753; the working expenses, £1,484,000; the net earnings, £1,230,000. The working expenses were 54.7 per cent. of the gross receipts and net earnings paid a profit of about 5½ per cent. on a capital of over £20,000,000. The increase in traffic earnings for the year was £154,000.

The General Manager, Mr. C. D. Elliott, pays special attention to the recent agitation on the subject of light railroads. He has previously and repeatedly expressed the opinion that it would be a mistake to introduce a narrower gage than that which is now standard, namely, 3 ft. 6 in. He says if the gage of 4 ft. 8½ in. had been adopted from the first by the Cape system, the journey from Cape Town to Johannesburg could be made in one-half the present time. He quotes extensively from the opinions of the commissioners of New South Wales, which opinions we have already mentioned in writing on the railroads of Australia. It may be remembered that those commissioners recommended very strongly the adoption of a universal gage for Australia, the cost to be borne by all of the Colonies, and it is recommended further that those colonial railroads now of 5 ft. 3 in. gage should be changed to 4 ft. 8½ in.

It appears that the electric tramway is beginning to trouble the railroad men of the Cape as well as those of our own country, and the general manager suggests that it would be well for Parliament to consider whether it will allow private enterprise to interfere with a well-equipped line, built at public expense, by putting an electric tramway on a road also built at public expense.

Concerning passenger fares it is stated that the time seems to have arrived for making a new departure. Several traffic officers think that there should be only two classes, and this from the railroad standpoint would be the most economical course; but they have at the Cape also the problem of color, which seems to necessitate three classes. The general manager is disposed to think that the first and second class fares may be lowered without seriously affecting the earnings. He suggests that the first class fares should be four cents a mile, or that a sliding scale should be adopted commencing with six cents and coming down to four cents. He recommends that there should be no serious reduction of freight rates except where increased tonnage may be gained. The ton-mile rate is not given in the report.

Under the head of general improvements we are informed that bedding provided for passengers has been much appreciated; that the acetate-of-soda foot warmers have been disappointing; that the registration of baggage has proved a great success, and that considerable progress has been made with electric lighting.

The train mileage during the year was 7,092,799 miles, an increase over the mileage of 10 years before of almost 5,000,000 miles. Meantime the cost per train mile fell from 23.85 pence to 20.21 pence. The cost of hauling per train mile has not increased with the extension of the railroads, as had been anticipated, due largely to the fact that heavier loads are hauled and that the new lines are favorable as to grades and curves.

Forty new engines with six pairs of drivers coupled, the drivers being 4 ft. 6 in. in diameter, have been put in service, with a view to getting higher passenger speed. On easy sections they make 40 miles an hour with eight cars. One of these cars has a van in which the electric light accumulators are carried. These engines are used for both passenger and freight trains.

The shrinkage of the timber in the imported cars leads to the opinion that it is desirable to build the cars of stock seasoned in the Colony, and the steadiness of cars with long bodies and the ease with which they traverse

sharp curves indicate that there should be no hesitation about increasing the length of vehicles and adopting six-wheel trucks.

Electric lighting is now being used for the trains between Cape Town and Johannesburg. It is perhaps the most costly method of train lighting, but very satisfactory to the passengers.

The coal is now mostly supplied from the mines of South Africa, and the opening of seams from 6 to 60 ft. thick in the Transvaal promises keen competition and lower prices in the future. The information as to prices and comparative values of the colonial coals, found in the report, is too scanty to warrant any deductions; but it is evident that hereafter Welsh coal can be used advantageously only on those parts of the lines near the sport.

TECHNICAL.

Manufacturing and Business.

Bryan & McKibbin, dealers in railroad, steamship and contractors' supplies, 120 Broadway, New York City, have been appointed General Eastern Agents for Phillips, Nimick & Co., Ltd. (Sligo Rolling Mills), of Pittsburgh, Pa.

The Trojan car coupler is being put on the new cars for the Beech Creek road building by the Buffalo, Milton and Union Car Works. This order is for 1,000 cars. The coupler is also being put on 275 new cars being built for the Intercolonial road of Canada.

The Franklin Steel Castings Co. filed a charter at Harrisburgh, Pa., last week, with a capital placed at \$570,000.

The National Switch & Signal Co. has largely increased the force of men working at its shops at Easton, Pa., and announces an increase of 10 per cent. in wages.

Unusual activity is the rule in all departments of the Link Belt Machinery Co., Chicago. The company has more contracts on hand now than at any similar period during the past five years. Recent orders for the "Standard" water tube safety boilers have been received from the following: Western Electric Co., Chicago, 600 H. P.; Globe Soap Co., Cincinnati, 250 H. P.; Mabley & Co., Detroit, 700 H. P.; Jobbings & Van Ruymbeke, Aurora, 150 H. P.; Keystone Woven Wire Fence Co., Peoria, Ill., 75 H. P., and Cincinnati Edison Co., Cincinnati, 500 H. P.

Iron and Steel.

The Maryland Steel Co. has recently filed for record in Pennsylvania a mortgage for \$7,000,000 in favor of a Philadelphia trust company. An issue of bonds amounting to \$4,000,000 is to be made jointly by the Pennsylvania and Maryland Steel Companies under this mortgage in accordance with the reorganization plans, and these will be offered for subscription. The remaining \$3,000,000 of the bonds authorized by the mortgage will be used to refund maturing bonds.

The large plant of the Troy Steel & Iron Co. was sold at Albany, N. Y., on Aug. 22 to a representative of the Reorganization Committee for \$400,000. The new company will be immediately organized to control the property, and in the meantime the plant will be put in a condition to resume operations. It has not been operated for about three years. It is said that the real estate held in Troy will be sold and large rolling mills will be built on Breaker Island in Albany County near the company's blast furnaces. Under the reorganization plan the creditors receive 50 per cent. of their claims in bonds of the new company and 50 per cent. in preferred stock, the stockholders of the old company paying an assessment of 33¼ per cent., for which they receive bonds. The Reorganization Committee includes H. H. Rogers, of New York, Smith M. Weed, and H. G. Young, Vice-President of the Delaware & Hudson Co., which company is understood to be financially interested in the reorganization of the steel company. That road will secure a large traffic when the plant is again in operation.

The Midland Steel Co. is to build an addition, 80 ft. x 120 ft., to its plant at Muncie, Ind. The new building will be of iron, and will be occupied by a three-roll high sheet bar mill.

The Riverside Iron Works, whose plant is located at Benwood, W. Va., announces a 10 per cent. increase in wages, which affects about 2,000 employees. This is the second increase which has been made in the last three months, the wages now paid being the same as those of two years ago.

New Stations and Shops.

Plans have been completed for a new station, to cost about \$10,000, to be erected by the Boston & Maine Railroad at Manchester-by-the-Sea, Mass.

The Cleveland, Lorain & Wheeling is to build a new freight house at Lorain, O. The company is also trying to obtain dock property, to make other terminal improvements to handle the traffic from the Johnson Steel Works and the Lake Erie freight steamers, which hereafter will stop at Lorain.

The Chesapeake & Ohio is rebuilding the erecting shop at Huntington, W. Va., which was burned a few weeks ago. The new building will be about double the size of the old structure.

The Staten Island Rapid Transit road will probably begin active operations in September on the new ferry house at St. George, S. I. It will comprise a three-story frame office building and one-story waiting-room, 50 ft. x

150 ft., a one-story frame restaurant, 70 ft. x 82 ft., a one-story express and baggage building, 70 ft. x 70 ft., and a one-story frame boiler-room, 36 ft. x 30 ft. It is also proposed to construct a covered wooden bridge, 12 ft. wide by about 1,000 ft. in length. All the buildings are to be frame, sheathed with corrugated galvanized iron, and roofed with slate. The interior is to be finished in cypress, and will have steam heat, electric lighting and all sanitary conveniences. The total cost of the improvement is estimated at about \$170,000. Baldwin & Pennington, of Baltimore, are the architects.

The Mobile & Ohio is to build new shops and a roundhouse at Mobile, Ala. The plans and specifications for the structures have been recently completed and the officers expect to have the buildings under way within a few weeks.

The Pennsylvania will build a new roundhouse near Mansfield, O., for the Toledo & Walhonding Division.

The Freight Car Handhold Law.

The Executive Committee of the Master Car Builders' Association has made a report in which it holds that the United States law of March 2, 1893, is fully complied with as regards grabirons or handholds, if cars are equipped in accordance with the schedule given below:

KIND OF CAR.	SIDE HANDHOLDS.	END HANDHOLDS.
1. Box or stock car with end platforms and end ladders.	One over each step.	Two on each end; ladder may take the place of one.
2. Box or stock car with end platforms and side ladders.	One over each step, except where the ladder is located.	Two on each end.
3. Box or stock car without end platforms, but with end ladder.	One over each step.	Two on each end; ladder may take the place of one.
4. Box or stock car without end platforms, but with side ladders.	One over each step, except where ladder is located.	Two on each end.
5. Gondolas with drop ends.	One over each step.	Two on each end.
6. Gondolas with fixed ends.	One over each step.	Two on each end; brake step bracket may take the place of one.
7. Tank cars.	One over each step; safety railing may take its place.	Two on each end.
8. Flat cars.	One over each step. If no steps are used, one on each side near end where coupling unlocking rod is located.	Two on each end.

NOTE.—A coupler unlocking rod, if so located that it can be grasped with the hand, may take the place of a handhold.

The Jerome Park Reservoir Contract.

The litigation over the award of the contract for the Jerome Park reservoir, New York, has been settled by the decision of Judge O'Brien, who recently denied the application made by taxpayer Isaac H. Terrell for a permanent injunction to restrain the Aqueduct Commission from awarding the contract to John B. McDonald, of Baltimore. Terrell took this position in the matter in the interest of Contractor John O'Brien, whose bid was \$174,710 less than McDonald's. The judge said that he had looked in vain for any evidence to sustain charges that the Commissioners acted fraudulently or were influenced by unlawful means, and that since the legislature has left the determination of the persons who are to do the work to the judgment and discretion of the Commissioners, their action in making the award was sustained. On Aug. 23 the Commissioners met and ordered the execution of the contract by John B. McDonald, heavy bonds being filed by the latter.

The Popp-Conti System of Pneumatic Tramways.

Cars, with small reservoirs, storing compressed air at 140 to 280 lbs., are used upon an experimental line on the above system in Paris. The car reservoirs are semi-automatically refilled from pipes under the road through especially designed valves located in the rail groove at several points along the line. The motor used is a two-cylinder compound, and the air for both high and low pressure cylinders is heated by a coke fire before entering the cylinders. The system claims the advantages of simple central station machinery, low cost and convenience in operation.

Award of Asphalt Paving Contracts.

We noted not long ago the award of several asphalt paving contracts for New York streets to the Fruin-Bambrick Co., of St. Louis, who were the lowest bidders. This was about half of the work for which bids were put in, but the entire contract was not let to the above company, since some doubts were entertained as to their ability to carry it out properly. The remainder of the work was again advertised for and has been awarded as follows: Five contracts, aggregating \$133,134, to the Metropolitan Asphalt Co., their bids ranging from \$3.35 to \$3.67 a square yard. This includes Chrystie street, from Grand to Houston, and Allen, Clinton and Essex streets, between Division and Houston. The other lot of five contracts was let to John J. Cummings at \$194,322.20, the bids varying from \$3.06 to \$3.18 per square yard. This includes Park street, from Mott to Centre; Baxter, from Park row to Grand; Mott street, from Park to Broome street; Hester, from Bowery to Centre

Bayard, from Baxter to Division; Franklin, from Baxter to Centre; Spring, from Sullivan to Greenwich, and Clark, from Broome to Spring. As will be noted, the prices for the latter contracts are lower per square yard than those for the former. This is due to the fact that the wear on the latter street is not as severe as that upon those awarded to the Metropolitan Asphalt Co.

THE SCRAP HEAP.

Notes.

A large warehouse and dock occupied by the Chicago, Milwaukee & St. Paul Railway at Milwaukee, was burned on Aug. 22. A large quantity of freight was destroyed.

On the Philadelphia Division of the Pennsylvania Railroad the block signal operators who work 12 hours a day will hereafter be relieved by a regular substitute for two days at a time, once a month. The provision of this substitute by the company at its own expense is a commendable act; the chief defect in it is that the operators ought to be relieved about once a week instead of only one day for each two weeks.

On the night of Aug. 20 a train of the Chicago & West Michigan was stopped by robbers near New Richmond, Mich., and the express car was badly damaged by dynamite. It is said that not much property was taken. As the robbers went away they shot the rear brakeman, inflicting a serious wound. On the night of Aug. 22 a detective named Powers who was hunting for these robbers was shot, in a passenger train at Grand Rapids, by a man he was intending to arrest. Two nights later the assassin of Powers was shot and killed by two detectives who cornered him in a farm house. On the night of Aug. 20 train No. 8 of the Union Pacific was stopped by robbers near Gothenburg, Neb., and the express car was badly damaged by dynamite. The engine was not fully guarded in this case and the fireman succeeded in detaching it and running it to the nearest station for assistance.

Shipping Notes.

The Cramps Shipbuilding Co. has been awarded the contract for an ocean tug to be built to the order of the Philadelphia & Reading Railroad Company. The boat is to be 170 ft. in length and will have triple expansion engines.

The American line transatlantic ship St. Paul is now receiving her cabin decorations and upholstery. She will soon be ready to take her place in the fleet.

The Boston Tow Boat Co., operating a large fleet of coal barges between Philadelphia and New England ports, has announced its intention of dropping out of the Philadelphia trade and hereafter will send all its craft to Norfolk and Newport News.

The Hamburg-American line will establish in October a regular monthly steamship service from Norfolk, Va., to Hamburg.

The United States Shipping Co. is about to establish a regular steamship service from Pensacola, Fla., to Liverpool, to be operated in conjunction with the Louisville & Nashville Railroad. The service is intended to develop the foreign traffic of the Louisville & Nashville road. The first steamer of the line will leave Pensacola on Oct. 23, and it is expected to make at least two sailings each month.

South American Notes.

The President of Chili, in his recent message to Congress said, concerning railroads in that republic: "Railroad construction has been satisfactorily progressing. The government has accepted as completed the line between Pichi Ropulli and Orsorno, and will shortly do likewise with the lines from Victoria to Tenuco, from Parral to Cauquenes, and from Coigüe to Mulchen. The important line from Valdivia to Pichi Ropulli is being duly proceeded with, and means will be taken to prosecute the construction of the lines from Caleva to La Ligua and Cabildo, Los Villos to Illapel and Salamanca, Talca to Constitution, and Tenuco to Petrafuen. The new railroad line from Melipilla to Quilpué, which will complete the alternative route between Valparaiso and Santiago, is being surveyed. The Department of Public Works has been instructed to prepare a study for the projected line to join the existing railroad system to the northern provinces. The precarious condition of the mining industries in Coquimbo and Atacama makes it urgent that Congress should pass the bill for buying the private railroads in those provinces, with the object of reducing freights and stimulating production. The purchase of the Coquimbo Railroad is ready to be completed, and that of the Copiapó Railroad is being negotiated. The government has named a commission to study the best means of reorganizing the state railroad service. Meanwhile efforts have been made to improve the administration. The rates of freight on some staple products of the country have been lowered, and it has been endeavored to attend to the carriage of Chilean produce expeditiously."

The improvement in the condition of the non-guaranteed railroads in Argentina, which has been going on for the past two years, still continues, as appears from the provisional estimates of earnings for the first half of the current year. The Buenos Ayres Great Southern shows net earnings, after deducting all fixed charges, of \$1,125,000. The working expenses have been reduced to 36 per cent. of the gross income. The Buenos Ayres Western also earned a net sum of \$450,000, with working expenses maintained at 45 per cent. The Buenos Ayres & Rosario comes up to \$335,000, with operating expenses at 48 per cent. The Central Argentine also reaches a net balance of \$530,000, and has succeeded in reducing its operating expenses from 56 per cent. to 54 per cent. The Argentine roads may be said to have fairly emerged from the depression which followed the great boom of a few years ago.

A California Romance.

The ingenuity of a San Franciscan is responsible for a marvelous piece of mechanism, by which one's phiz may be transferred to cardboard almost as quick as thought. About two years ago Julius Gregory, an apprentice in a machine shop, undertook the construction of an apparatus for transferring to an ordinary railway ticket the portrait of each purchaser while he is paying the clerk for his transportation.

Success attended his efforts—that is, so far as the simple mechanism is concerned. It remained for Frank

Daye to perfect the machine. This required a series of baths for developing solutions, an arrangement to insure proper immersions of the ticket in the baths, and a novel flashlight attachment. The tickets used must be of special manufacture, two inches of the end of each being of sensitized material, which must be kept in a light-tight paper case. A purchaser presents himself at the window and asks for a ticket. The sensitized end, with its paper covering, is slipped into a frame. The whole is then inserted in the slot at the top of the machine. The operator presses a spring, a percussion cap explodes, igniting a flashlight, the lens uncovers, shutting almost instantly, and in the twinkling of an eye the picture is being automatically developed. The explosion of the flashlight sets the machinery in operation, an elevator draws the ticket down, leaving the light-tight case behind, to a point where the first bath meets it. This bath is filled with developing solution. The first bath then gives place to the second. As these baths recede they empty into the lower tank, where the development is completed. The elevator then returns the ticket to the slot, and the operator pulls it out and presents it to the purchaser. The whole process occupies less than a minute. Thus the ticket is made absolutely non-transferable. Any form of ticket can be thus treated, and in the near (?) future Oakland commuters will have their photographs printed on their tickets.—*San Francisco Chronicle*.

Austro-Hungarian Railroads.

In May, 1895, there were in Austria-Hungary 18,540 miles of railroads, trunk lines and feeders, operated by steam locomotives. During said month they carried 13,774,181 passengers and 9,355,259 tons of freight, receive therefor \$13,393,164, or \$722 per mile, a decrease of 1½ per cent. compared with May, 1894. Taking the receipts of the first five months of 1895 as a basis for a calculation of the receipts of the whole year, the gross earnings for 1895 will show a decrease of 5.4 per cent. below those of 1894.

A Compromise.

A press despatch of Aug. 26 says: A compromise has been reached in the litigation arising from the destruction last summer of the business portion of Genoa, Ill., by fire. The loss was \$300,000 and the insurance companies lost \$119,000. The allegation was made that the fire was caused by sparks from a Chicago & Alton locomotive, and on that theory the insurance companies sued the Alton for that sum. One case was tried and the jury disagreed. The Chicago & Alton agrees to pay to each loser 10 per cent. of the loss not covered by insurance, of which sum 25 per cent. is to be paid to the insurance companies.

A Pass Fraud.

Sir Charles Scotter, General Manager of the London & South Western of England, warns American railroad officers that some unscrupulous person is using his name in this country without authority. Applications for passes have been sent out written upon letter heads entitled:

SOUTHWESTERN RAILWAY OF ENGLAND,
Office of the General Manager,
Waterloo Station, London.

These letters, signed "Charles Scotter," are pronounced forgeries.

The New Jersey Junction Crossing Fight.

The Jersey City crossing fight between the Pennsylvania Railroad and the National Docks & New Jersey Junction Connecting Railway, which has been pending in the courts for five or six years, and which was recently the subject of what ought to have been a final decision, has now become a physical contest, and the New York daily papers find material for columns of text and pictures about it. The reports indicate that the tactics employed on both sides are nearly if not quite as barbarous as any that were ever heard of in the wild and woolly West, and the reader is compelled to reflect on the spectacle of a crossing war within sight of New York City as disgraceful as those reported in communities supposed to be far less civilized. While no pistols or bludgeons were used there would seem to be quite a lively chance that if the officers of the law in New Jersey are as energetic and firm as those at Abington, Mass., some railroad officer may get into jail, as happened at the latter place. It will be remembered, from our previous account, that the last court decision was in favor of the Junction Railroad, and was to the effect that the Pennsylvania must accept \$130,000 for the damage to its property; this sum was tendered, but was refused, and was finally paid into the court. The particulars of the fight up to Tuesday evening, as related in the New York Tribune, are as follows:

"The proposed tunnel is at what was formerly known as the Point of Rocks, but is now the Waldo avenue yard of the Pennsylvania Railroad, used for storing passenger cars and making up trains. Here is one of the largest round-houses in the country, and engines are constantly entering or leaving it. The tunnel when built will be 450 feet long and will be under 27 tracks of the Pennsylvania. After the judgment in its favor the Junction Company began active preparations to construct the tunnel, which will give it a clear roadway from Weehawken to the National docks.

"The Pennsylvania asserted that its entire yard would have to be elevated 16 in. to enable the Junction road to follow the grade laid out, and when the first track was reached (on the south side) it was decided not to let the Junction road encroach further. Yesterday morning a train of 12 passenger cars and 10 gondolas came and stood directly over the tunnel excavation and 80 laborers began shoveling ashes and cinders from the gondola cars into the excavation. As fast as the men threw the ashes in the hole, a gang of Junction men shoveled them out and threw them on flat cars, which hauled them away. A laborer was hit by a stone thrown from a Pennsylvania car, and police were sent for. They would not interfere directly, as long as no more violence was shown, and so the shoveling contest continued for hours.

"The Junction Company finally secured 50 warrants, charging assault and battery and five Pennsylvania laborers were taken into custody. At about 1 p. m. the Pennsylvania men saw that they were not making much headway, and so they put into service two large hoses, which they turned on the Junction men. This led to the arrest of six more men, but the hose continued in service. At 3:30 p. m. the Pennsylvania men tried to drive heavy planks into the earth just where the Junction people wanted to excavate. Colonel Sterling gave orders to prevent this, and his laborers, with a wild yell, rushed for the timbers that were being driven. No blows were struck, but the pushing and hauling on the side of the steep bank, with two large streams of water being played on the struggling mass, were terrific. Just at this time the men in charge of the hose turned it on the police, and that spoiled their fun, for they were arrested, and the hose was shut off. Later another gang

was arrested, and this had scarcely been done when the Junction men got hold of the six-inch water-pipe of the Pennsylvania and broke out a dozen feet of it. Just as it became dark the Pennsylvania dumped two carloads of stones down the bank. This was too dangerous for the workmen and they stopped. In the course of the day twenty-seven arrests were made, and two men were held for the Grand Jury. The others were discharged."

LOCOMOTIVE BUILDING.

The Santa Fe, Prescott & Phoenix has placed a small order with the Brooks Locomotive Works.

The Richmond Locomotive Works has an order for eight additional engines for the Southern Railway. Four will be 6-wheeled connecting engines and the other four 8-wheeled connecting engines.

The Illinois Central this week placed orders for 30 of the 50 locomotives referred to in this column last week. The order was divided between the Brooks and Rogers Locomotive Works, the former receiving the contract to build 18 engines and the Rogers Works the contract to build 12 engines. The Brooks order includes 14 moguls and 4 switching engines and the Rogers order 10 moguls and 2 suburban engines.

CAR BUILDING.

The Minneapolis & St. Louis has increased its order with the Duluth Manufacturing Co., from 100 box cars to 200 cars.

The Bloomsburg Car Manufacturing Company received last week an order for 200 cars from the Lehigh Coal and Navigation Company. H. C. Frick & Co., coke manufacturers, are understood to have given an order for 100 cars for that company to the Bloomsburg Works.

Contracts were awarded at Ottawa last week for the construction of 160 platform cars, 75 box cars and 40 hopper cars for the Intercolonial road. Rhodes & Currie, of Amherst, N. S., will build 75 platform cars, 40 box cars and 40 hopper cars. The Rathbun Company, of Deseronto, Ont., secured the contract for the other cars of the order.

BRIDGE BUILDING.

Bowdoinham, Me.—The Berlin Bridge Co., of East Berlin, Conn., has the contract for a new iron bridge to be built at Kendall's Mills, near this place. The bridge will cost \$3,600.

Detroit, Mich.—Bids were received for the construction of a Melan arch bridge across the Michigan Central Railway, on the Boulevard, south of Michigan avenue, on Aug. 17, by the Commissioners of Parks and Boulevards, and were as follows: M. J. Griffin, \$34,412; Keepers, Wynkoop & Thacher, \$36,110 and \$34,730; Robert Dunn & Co., \$36,982; King Bridge Co., \$40,500; Wrought Iron Bridge Co., \$41,190; R. Robertson & Co., \$47,990. The royalty of 7½ per cent. to be paid by the contractor. For excavating approaches to the bridge: J. A. Mercier, 24 cents per cubic yard; John H. Charlton, 26 cents; Robert Dunn & Co., 28 cents; E. A. Norris and John A. Mercier, each 35 cents; Patrick McCoy, 36 and 40 cents; and J. Conn, 49 cents per cubic yard.

Hempstead, Tex.—The Chicago Bridge & Iron Co. has secured the contract for an iron bridge to be built by the County Commissioners of Waller County, in which Hempstead is situated. The bridge will cost \$22,000.

Palmyra, N. J.—The Bridge Committees of the Camden and Burlington County Freeholders opened bids last week for the construction of a bridge over the Pensauken Creek at Palmyra. The lowest bidder was the Gorton Bridge Co., of New York, at \$4,500.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is said that where railroad-aid bonds were made a lien on the road, and all property thereof which it had or might require, and it purchased land for terminal facilities, but did not use all of it for such purpose, the entire land was subject to the lien of the bonds.

The Supreme Court of Pennsylvania holds that the commonwealth, not an individual, is the proper party to complain that the construction of a branch by a railroad is not to accommodate the public, but an attempt to connect an individual siding without compliance with the lateral railroad statutes.

In the Federal Court it is ruled that Receivers who, upon taking possession of a railroad, have found a rule in force excluding members of labor organizations from employment on the road, will not be required to abrogate such rule, or to refrain from discharging employees who violate it, especially upon the petition of men who have obtained employment with notice of the rule, and in violation of it.

In New Jersey it is laid down that when a director of a railroad company holds some of the company's bonds which were illegally issued, and also others that were legally issued, and paid for by him, and it appears that the invalid bonds were part of an illegal scheme with which such director was connected from its inception, he is not entitled to have such valid bonds allowed as a claim against the Receiver of such corporation.

Injuries to Passengers, Employees and Strangers.

In Virginia a railroad wreck, injuring a passenger, occurred on a dark night, the rain falling in torrents, which flooded the track, laid along the side of a mountain; the train was stopped at times at exposed places, but met no obstruction until it reached the place of the accident, by which time the rain had ceased. This place was an earth fill, provided with a stone culvert 35 years old, and no accident had ever happened there. In consequence of a waterspout, the culvert did not carry off the water, and a great pond was formed against the earth embankment, causing it to give away, but leaving the rails and ties unbroken; and the train went down into this washout, killing plaintiff's intestate. The Supreme Court rules that defendant was not liable.

In Missouri a person who is blind, aged, sick, or infirm, if his condition is known to the carrier, is entitled to more care and attention than one who is under no such disability, as to the time allowed and assistance rendered in getting on and off the car.

In Tennessee where a person, after being told by the conductor of a freight train that he is forbidden by a rule of the company to carry passengers, induces the conductor to permit him to ride on the train, he becomes a trespasser, though he pays the regular fare, and the com-

pany is not liable to him for personal injuries not willfully inflicted.⁷

In New York it is held that where a contractor engaged in repairing defendant's depot kept tools and materials in a car, and the contractor's employees frequently each day, with the knowledge of defendant, crossed tracks to reach the car, defendant owes them the duty to use reasonable care for their protection while so crossing the tracks.⁸

In Indiana a certain action was for the death of a fireman on defendant's train, caused by the train running into a switch left open through defendant's negligence. It appeared that a light had been left on the switch as a signal that it was closed, though by a rule of defendant the absence of a light was a signal of danger; but that the light went out, and the engineer, though he saw there was no light, failed to stop. The Supreme Court rules that the leaving open of the switch, and not the engineer's failure to stop, was the proximate cause of the accident.⁹

In Iowa it is held that an employee who had held the same position at the place of the accident for some time, was familiar with the time of passage of a train, knew it was coming, and, while walking in front of it, heard the fireman call out to him, but, thinking he was on another track, failed to get out of the way, was negligent.¹⁰

In Iowa a railroad is not required to instruct one entering its service as brakeman how to mount moving cars, when such employee has had long experience in so doing and knows the dangers attendant thereon.¹¹

In Pennsylvania it is not contributory negligence for a brakeman to make a flying switch, where it is required by the nature of his employment.¹²

In Missouri a locomotive fireman and a section foreman, each acting in his proper sphere, are not fellow servants.¹³

In Indiana the Supreme Court rules that where a brakeman notifies the railroad that a lamp furnished him is defective, and liable to go out at any time, and the company promises to supply him with a new lantern in a short time, and directs him to go on with his work, he does not, by continuing work, assume the risk of danger from the defective lantern, unless the danger is so imminent that no one but a reckless person would continue in the service.¹⁴

In a Pennsylvania case the ground of recovery against the railroad company was its failure to furnish an employee with safe machinery. It appears that deceased was a coal shoveler in S. & Co.'s employ; that they received loaded cars on a trestle owned by them; that the cars passed down by gravity, and the speed was regulated by the brakes; that the railroad company delivered to S. & Co. a loaded car, one brake of which was missing, and the other defective; that "No brake" and "Bad brake" were written on the ends of the car; that such car was started down the incline, and ran into a car in which deceased was at work, and killed him. There was no evidence as to when the brakes became defective. The Supreme Court rules that there was no evidence of negligence of the railroad company.¹⁵

The Supreme Court of Missouri rules that where a roadmaster, who was the immediate overseer of the work done by plaintiff as section foreman, delivered to a fireman a letter of instructions, to be given to plaintiff as the engine passed him on the road, and plaintiff, by the fireman's signals, knew that he had a message for him, and signaled in return for its delivery, but was injured by a piece of coal to which the fireman fastened the letter before throwing it, plaintiff and the fireman, having co-operated in the particular business in hand, were fellow servants.¹⁶

In Indiana a train crew, of which deceased, an experienced brakeman, was a member, was making a "kicked switch," prohibited by the rules of the company unless absolutely necessary. Deceased ran in front of the cars to arrange their couplings, and, catching his foot in a frog, was killed. The Supreme Court holds that deceased was guilty of contributory negligence.¹⁷

In Mississippi failure to have sand in the dome of a locomotive is not failure to provide a safe appliance, but as regards a brakeman injured thereby while coupling cars, the negligence of the engineer or fireman whose duty it is to fill it, and these are his fellow servants in the same department of labor.¹⁸

In the Federal Court, a foreman of a railroad's bridge carpenters, who has, by the order of his superior (the Superintendent of the Bridge Building Department) gone on a train, to be transported to his place of work is not, while being transported, a fellow servant of the conductor.¹⁹

In Delaware the brakeman of a train, while signaling the train following his own, acts as the fellow servant of the fireman of the train to be signaled.²⁰

In Indiana the other members of a train crew engaged with a brakeman in making a "running switch," under orders from their conductor simply to sidetrack certain cars, are his fellow servants.²¹

In Texas plaintiff testified that as he drove toward defendant's railroad crossing he was not paying much attention to its condition, as he was looking out for a train then due; that he got upon the track all right, but when he went to leave it, on the other side, the wheel of his wagon fell into a deep rut, and he was thrown out; that the highway crossed the track obliquely, which caused the right wheels of wagons to leave the track before the left, so that a hole was cut in the road next to the track, which a person approaching as he was would not see unless he was looking for it; and that the side on which he approached was in better condition than the other side. The Supreme Court rules that a finding that plaintiff was not negligent was justified.²²

Milwaukee & Winnebago, 3 per cent. on the preferred stock, payable Aug. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 21.
Iowa Central, annual, Sept. 6.
Louisville, New Albany & Chicago, annual, Sept. 18.
Malone & St. Lawrence, special, New York, N. Y., Sept. 12.
Minneapolis & St. Louis, annual, Minneapolis, Oct. 1.
New York, Susquehanna & Western, annual, Taylor's Hotel, Jersey City, N. J., Sept. 5.
St. Lawrence & Adirondack, special general, Montreal, Sept. 13.
Toledo & Ohio Central, annual, Toledo, O., Sept. 2.
Toledo, St. Louis & Kansas City, annual, Toledo, Sept. 11.
Wabash, annual, St. Louis, Mo., Sept. 10.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Society for the Promotion of Engineering Education will hold its second annual meeting at Springfield, Mass., Sept. 2, 3 and 4.

The National Railroad Master Blacksmiths' Association will hold its annual meeting at Cleveland, O., beginning on Sept. 3, 1895. The programme was published in the Railroad Gazette of Aug. 16.

The Association of American Locomotive Traveling Engineers will hold its annual convention at the Seventh Avenue Hotel, Pittsburgh, beginning Sept. 10, and lasting till the 14th. C. B. Conger, of Grand Rapids, Mich., is President of the organization, and W. O. Thompson, of Elkhart, Ind., Secretary and Treasurer.

The Master Car & Locomotive Painters' Association will hold its next annual meeting at the Grand Hotel, Cincinnati, Sept. 11, 12 and 13. The programme of this meeting was published in the Railroad Gazette of Aug. 9.

The International Railroad Conference of Young Men's Christian Association is to be held at Clifton Forge, Va., Sept. 13, 14 and 15. Mr. C. J. Hicks, 40 East Twenty-third street, New York City, is Secretary of the Railroad Department of the International Committee. The programme was published in the Railroad Gazette of Aug. 9.

The American Association of General Baggage and Ticket Agents will hold its semi-annual meeting at Boston, Sept. 17.

The American Association of General Passenger and Ticket Agents, will hold its semi-annual meeting at the Hotel Vendome, Boston, Sept. 17.

The New England Roadmasters' Association will hold its annual meeting at the Revere House, Boston, on Sept. 18 and 19. The programme was published in the Railroad Gazette of Aug. 9.

The American International Association of Railroad Superintendents of Bridges and Buildings will hold its annual meeting at New Orleans, La., Oct. 15.

The American Street Railway Association will hold its annual meeting at the Windsor Hotel, Montreal, Oct. 15 to 18.

The Roadmasters' Association of America will hold its annual meeting at St. Louis, Mo., Oct. 15, 16 and 17.

The American Railway Association will hold its fall meeting at New York City, Oct. 16.

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The Central Railway Club meets at the Hotel Troguois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The Southern and Southwestern Railway Club meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The Northwestern Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The Western Society of Engineers meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Boston Society of Civil Engineers meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The Engineers' Club of St. Louis meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at the Cumberland Publishing House, Nashville, Tenn.

The Engineers' Society of Western Pennsylvania meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Association of Engineers of Virginia holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and

December, when they are held on the second Tuesday only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The Engineers' and Architects' Club of Louisville meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The Western Foundrymen's Association meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The Association of Civil Engineers of Cornell University meets on Friday of each week at 2.30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

Contracting Freight Agents.

The National Association of Contracting Freight Agents held its 10th annual meeting in New York City this week. The President of the association is Mr. Burton Johnson, of Chicago.

American Association of General Passenger and Ticket Agents.

The fortieth semi-annual meeting of this association will be held at Hotel Vendome, Boston, Sept. 17.

The report presented at the New York meeting, having for its object an effort to control the issuance of through tickets by unreliable parties, will come up for further consideration.

The resolution offered by Mr. Van Bergen through Mr. Heafford at the Quebec meeting, respecting the use of certain terms to be used, as applied to the various kinds of tickets now in use, is also to be further considered.

A committee, consisting of Messrs. A. S. Hanson, C. O. Scull, Geo. DeHaven, Geo. T. Nicholson, E. W. LaBaume, N. J. Power and Chas. S. Fee, were appointed at the New York meeting to consider the question of pasteur contracts, and it is expected that they will be prepared to report at this meeting.

Mr. W. A. Turk will deliver the semi-annual address.

PERSONAL.

—Mr. J. A. Knapp, Commissioner of the Freight Bureau at Savannah, Ga., has resigned.

—Mr. C. W. Hale has been appointed General Freight and Passenger Agent of the Kansas City, Watkins & Gulf road in Louisiana.

—Mr. George D. Massey has been elected Secretary of the Georgia State Railroad Commission, succeeding Mr. A. C. Briscoe, who has resigned.

—Mr. H. N. Loomis, who has been for some years identified with the Standard Coupler, has resigned and assumed the Western Agency of the Trojan Car Coupler Co., with office at Chicago.

—The report of the resignation of Mr. N. D. Wiggins, Division Superintendent of the Illinois Central, and the transfer of Mr. W. S. King, is said by the Illinois Central officers to be erroneous.

—Mr. Burton Hanson, of Milwaukee, has been appointed General Solicitor of the Chicago, Milwaukee & St. Paul road. Mr. Hanson succeeds John T. Fish, who resigned the position about a year ago.

—Mr. S. W. Fordyce, of St. Louis, President of the St. Louis Southwestern road, has just been appointed Receiver of the Stuttgart & Arkansas River line, which operates about 40 miles of road in Arkansas.

—The Mobile & Birmingham announces that the Freight and Passenger departments of the company will be consolidated. Mr. E. A. Niel is appointed General Freight and Passenger Agent, vice Messrs. Ray Knight and L. A. Bell, resigned.

—Mr. George L. Reis, of Cleveland, recently Commissioner of the Bar Iron Manufacturers' Association, has been appointed Superintendent of the Milwaukee Works of the Illinois Steel Co. He succeeds Mr. C. S. Otjen, who has been Superintendent of these works for about seven years.

—Mr. Bradford Dunham, who some months ago was appointed General Superintendent of the Plant lines, has recently had his authority considerably extended, and in addition to his duties as General Superintendent will hereafter act as Manager of Construction and Chief Engineer of the Plant Railroad Lines.

—Mr. H. C. Stuart, of Kansas City, has recently been appointed General Passenger and Ticket Agent of the Chicago, Iowa & Dakota road in Ohio. Another appointment announced by Mr. Miller, the new President of the company, is the selection of Mr. C. H. Geyer as Superintendent of Telegraph in place of Mr. W. L. Otley, resigned.

—Mr. Thomas Saunders has recently been appointed General Manager of the Kansas City, Watkins & Gulf road, operating about 100 miles of line south of Alexandria, La. He will succeed Mr. A. Thomson, Vice-President of the railroad company, who has been acting as General Manager since the resignation of Mr. Hammond a short time ago.

—Mr. Joseph F. Hill was last week elected Secretary of the Southern Railway Co., to succeed Mr. W. A. C. Ewen, who had been elected to that office when the company was organized. Mr. Hill is at present in the office of Mr. Baldwin, Third Vice-President, at Washington, D. C., and will assume his new duties at the company's office in New York City about Sept. 1.

—Mr. R. E. Wells has been appointed Assistant General Manager of the Santa Fe, Prescott & Phoenix road with headquarters at Prescott, Ariz. Mr. Wells has heretofore been Assistant to Mr. F. M. Murphy, President and General Manager. With this change in title he assumes in addition to the duties heretofore performed by him those of the Superintendent of Transportation in place of Mr. R. R. Coleman, who has resigned.

—Mr. George B. Peck has resigned the office of General Solicitor of the Atchison, Topeka & Santa Fe, and

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Delaware & Hudson Canal, quarterly, 1½ per cent., payable Sept. 16.

¹ Knevals v. F. C. & P., 66 Fed. Rep., 224.

² Rudolph v. P. S. V., 31 Atl. Rep., 131.

³ Platt v. Phil. & R., 65 Fed. Rep., 660.

⁴ Baker v. Guarantee Trust, 31 Atl. Rep., 1,740.

⁵ N. & W. v. Marshall, 20 S. E. Rep., 823.

⁶ Hanks v. C. & A., 1 Mo. App. Rep., 92.

⁷ L. & N. v. Hailey, 29 S. W. Rep., 367.

⁸ Dempsey v. N. Y. C. & H. R., 39 N. Y. S., 774.

⁹ S. & M. S. v. Wilson, 38 N. E. Rep., 343.

¹⁰ Vreeland v. C. M. & St. P., 60 N. W. Rep., 542.

¹¹ Yeager v. B. C. R. & N., 61 N. W. Rep., 215.

¹² Dooner v. D. & H. C. Co., 30 Atl. Rep., 269.

¹³ Card v. Eddy, 28 S. W. Rep., 753.

¹⁴ Ind. Union v. Oct., 38 N. E. Rep., 812.

¹⁵ Rehm v. P. R. R., 30 Atl. Rep., 356.

¹⁶ Card v. Eddy, 28 S. W. Rep., 973.

¹⁷ Sheets v. R. Co., 39 N. E. Rep., 151.

¹⁸ Ill. Cent. v. Jones, 16 South. Rep., 300.

¹⁹ N. P. v. Beaton, 61 Fed. Rep., 563.

²⁰ Wheatley v. P. W. & B., 30 Atl. Rep., 663.

²¹ Sheets v. C. & Ind. Coal, 39 N. E. Rep., 151.

²² M., K. & T. of Texas v. Howell, 30 S. W. Rep., 38.

Mr. E. D. Kenna, of St. Louis, who has been General Attorney of the St. Louis & San Francisco road, has been appointed his successor as General Solicitor of the Atchison. Mr. Peck has been with the Atchison company for many years of its history as the head of its legal department. Early this year he removed from Topeka to Chicago.

—Mr. C. S. Blackwell has been appointed General Eastern Passenger Agent of the Cleveland, Cincinnati, Chicago & St. Louis, succeeding Mr. S. J. Gates, who is transferred to Louisville. Mr. Blackwell has been with the Big Four Co. for a number of years, and at present is Traveling Passenger Agent, with headquarters at Anderson, Ind. His successor at that point will be Mr. E. B. A. Kellan, of Anderson, who has been with the Big Four Co. about five years.

—Mr. James H. Nutt, of Youngstown, O., was elected Commissioner of the Bar Iron Association for the sixth district at a meeting of the members held in Cleveland last week. This association represents the manufacturers of bar iron throughout the United States. Mr. Nutt is at present the Secretary of the Shenango & Mahoning Valley Association, and succeeds to the vacancy caused by the resignation of Mr. George L. Reis, who has accepted a position at the Milwaukee Works of the Illinois Steel Co.

—Mr. George L. Bradbury, General Manager of the Lake Erie & Western road, has been appointed General Manager also of the Northern Ohio road, which succeeds the Pittsburgh, Akron & Western. He has been in charge of the operation of that line since it was purchased by Senator Brice. The road having been leased by the Lake Erie & Western, he has now received the formal appointment of General Manager. Mr. John H. Sample, who has been General Superintendent of the Pittsburgh, Akron & Western since the line was opened to Akron, will continue in that capacity.

—Mr. Epes Randolph, of Louisville, Ky., has been appointed Superintendent of the Yuma and Tucson divisions of the Southern Pacific road. Mr. Randolph has been connected for a number of years with Mr. C. P. Huntington's lines in Kentucky, and has been General Superintendent and Chief Engineer of the Newport News & Mississippi Valley Co. for several years. Mr. Randolph's transfer to the Southern Pacific road follows the promotion of Mr. J. W. Noble, formerly Superintendent of the Yuma and Tucson divisions to the Shasta division. Mr. H. Cooley, Superintendent of the latter division, has retired on account of ill health.

—Mr. E. C. Cronk, who has heretofore been Land Agent of the St. Louis, Iron Mountain & Southern, has had his authority extended to cover the general supervision of the land and real estate interests of the Missouri Pacific, except certain land grants of the St. Louis, Iron Mountain & Southern and the Little Rock & Fort Smith in Arkansas. These duties have heretofore come under the jurisdiction of the Land Commissioner for Missouri of the St. Louis, Iron Mountain & Southern, which position has now been abolished. It was formerly held by the late Mr. Stephen D. Barlow, who was Assistant Secretary of the St. Louis, Iron Mountain & Southern, as well as Land Commissioner for Missouri.

—Mr. Francis Hinton has resigned as a director of the Illinois Steel Co. This has caused important changes in the organization and management of the Milwaukee office of the Illinois Steel Co. Heretofore they have been operated as a distinct department of the company under the management of Mr. Hinton, who was Manager of the works when they were controlled by the North Chicago Rolling Mill Co., and continued in that position when the Illinois Steel Co. acquired the plant. The Milwaukee office of the company will now be closed. Mr. Hinton has been succeeded as a director by Mr. Robert Forsyth, Vice-President of the company, who retired from the board when Mr. J. W. Gates was elected President, so that the latter officer might enter the board.

—Messrs. J. R. Megrue and J. E. Matthews, the newly appointed Receivers of the Ohio Southern, announce that the office of General Superintendent Barrett has been abolished and its duties transferred to the Superintendent. Traffic Manager L. R. Brockenbrough having resigned, his duties have been assigned to J. F. Youse. S. Y. McNair has resigned as Auditor, and will be succeeded by N. E. Matthews, one of the receivers. The officers who have resigned hold similar positions on the Cleveland, Akron & Columbus, and of course their connection with that company is not in any way altered. When President Saul of that company was appointed Receiver of the Ohio Southern he extended the authority of the general officers of the Cleveland, Akron & Columbus over that road. Now that he has resigned as its Receiver these officers consequently resign also.

—The death of Mr. E. F. C. Davis, President of the American Society of Mechanical Engineers, which has already been noticed in these columns, was made the subject of the following preamble and resolution at the last meeting of the Council of the Society:

"The formal mould of memorial resolutions in which a corporate body ordinarily records its action seems inadequate for a proper voicing of the spirit which pervades the Council in the presence of the death of one whom its members had known so well, and whom they had learned to admire and love. His wise and mature judgment, his business and professional knowledge, his conservative yet energetic counsel, and his courteous consideration for others, had made him one from whose administration of the Society's affairs the highest hopes had been entertained.

"Although with such grief the stranger intermeddled not, yet the Council would presume to express their heartfelt sympathy with those nearest and dearest to Mr. Davis, upon whom this blow has so crushingly fallen.

"Resolved—That copies of this minute be furnished to the Engineering journals." * * *

ELECTIONS AND APPOINTMENTS.

Guatemala Central.—The annual meeting of the company was held at San Francisco, Aug. 20, and the following officers were elected: President, C. P. Huntington; Vice-President, Charles F. Crocker; Directors, H. E. Huntington, C. G. Lathrop and C. E. Green; Treasurer, F. S. Doudy; Secretary, G. L. Lansing.

International & Great Northern.—J. H. Hawley has been appointed Soliciting Freight Agent at Galveston, Tex., of the International.

Lehigh & New York.—The Directors of this company, organized to succeed the Southern Central, are as follows: Simon Borg, of New York; G. A. Hobart, of Paterson, N. J.; Wilson S. Bissell, George J. Sicard and Peter C. Doyle, of Buffalo; Henry S. Drinker, of Haverford, Penn.; Franklin P. Tabor, Edward G. Wride, Henry D. Titus and Ramson R. Cross, of Auburn, N. Y.; Eugene

H. Satterlee, of Rochester; Frank A. Eldridge, of North Fair Haven, and John M. Brainerd, of Auburn, N. Y.

Northern Ohio.—The following are the officers of the new company: H. L. Brice, Lima, O., President; G. L. Bradbury, Indianapolis, General Manager; John H. Sample, General Superintendent; A. S. Miller, Acting General Freight and Passenger Agent, and W. P. Fulton, Auditor, with offices at Akron, O.

Pan-American.—The stockholders met at Victoria, Tex., Aug. 23, and a reorganization was effected. The following Directors were elected: W. H. Weiner, of Philadelphia; B. E. Orr, W. M. Babbott, T. E. Robinson, of New York, and F. B. Hubbell, of Texarkana. The following officers were elected: President, F. B. Hubbell; Vice-President, B. E. Orr; Treasurer, J. M. Brownson; Secretary, George Vineyard; J. B. Wells, Attorney.

Santa Fe, Prescott & Phoenix.—R. E. Wells has been appointed Assistant General Manager, and will perform, under this title, his present duties as assistant to the President, and those heretofore devolving upon the Superintendent of Transportation, which latter office has been made vacant by the resignation of R. R. Coleman. His office is at Prescott, Ariz.

O. H. Jackson has been appointed Master Mechanic of this company, with headquarters at Prescott.

Southern Pacific.—Epes Randolph, of Louisville, Ky., has been appointed Superintendent of the Yuma and Tucson divisions, with headquarters at Tucson, Ariz. He succeeds J. H. Noble, who has been appointed Superintendent of the Shasta division. Mr. Noble succeeds H. Cooley, who has resigned on account of ill health.

West Virginia Central & Pittsburgh.—The annual meeting was held at Atkins, W. Va., Aug. 20, the old Board of Directors, consisting of Henry G. Davis, Stephen B. Elkins, and F. S. Landstreet, of West Virginia; Arthur P. Gorman, John A. Hamilton and W. W. Taylor, of Maryland, and R. C. Kerens, of St. Louis, were re-elected. Hon. H. G. Davis was re-elected President, and C. M. Hendley, assistant to the President, was also appointed Secretary.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Allegheny & Chartiers.—The incorporation of this company was noted last week. The line will be built as a terminal road for the fuel gas plant to be erected on Brunot's Island, near Pittsburgh, by the Philadelphia Company. The road will be less than two miles long and connect the gas works with the Pittsburgh & Lake Erie, the Panhandle and the Pittsburgh, Chartiers & Youghiogheny roads. The Ohio Connecting bridge now crosses the island, giving the proposed plant connection with the Ft. Wayne and Cleveland & Pittsburgh roads. The charter gives the company the right to construct a bridge from the island to the Allegheny side of the river, thus giving them connection with the Pittsburgh & Western. The road will be constructed on elevated bridge work, and will be so arranged that coal trains can be run in over the gas retorts and emptied directly into them through traps in the bottom of the cars.

Atchison, Topeka & St. Joseph.—This company has recently filed a charter with the Secretary of State of Kansas. It is proposed to construct a road from St. Joseph, Mo., to Topeka, Kan. The incorporators are A. H. Horton, ex-Chief Justice of the Supreme State Court; B. P. Waggener, W. P. Waggener, J. W. Orr, C. S. Hetherington, C. C. Flack and S. C. Harburger.

Dallas Terminal Railway & Union Depot Co.—President W. C. Connor announces that the actual work of construction on this belt line at Dallas, Tex., will be started this month. Orders for the rails have been placed with the Illinois Steel Co., and contracts for all the cross ties, bridge timbers, etc., have also been entered into. It is intended to complete five miles of line before November next.

Erie & Central New York.—Tracklaying was begun on this road at Cortland, N. Y., Aug. 27. The road is to extend from Cortland to Cincinnati, a distance of 15 miles, and it is the intention of the company to extend it to Hancock or Deposit. The road was graded many years ago, and some bridges were then built. No rails were ever laid, however. The work of construction is now to be pushed forward and the road completed.

Gulf & Interstate.—The tracklaying through Bolivar Peninsula, from Beaumont, Tex., to a point opposite Galveston which the officers promised to have under way early in July, has only just been started. The work is being done with a tracklaying machine, and as there is considerable material on the ground the 60 miles of road which has been graded for sometime through Bolivar Peninsula will be finished within 30 days.

Lehigh Valley.—The company has commenced to build a line connecting its main line with the Easton & Northern road. This route, though only about three miles in length, will be a very important connection. It will cross the Lehigh River, opposite Sixth street, Easton, Pa., then run west along the hillsides above the tracks of the Central of New Jersey, and then will again pass into the city limits and connect at Thirteenth street with the Easton & Northern road. The connection will open up many manufacturing sites. The Lehigh Valley, in order to build it, will have to remove what is known as the old bridge works in South Easton.

Long Island.—When the extension of the South Shore Division of this company's line beyond Bridgehampton was undertaken this year, it was stated that the terminus of the new line for the present would be at Amagansett, eight miles beyond the old terminus. This new line is a part of the Montauk Extension road which has a charter to build to Fort Pond Bay, at the extreme end of Long Island. It now seems that an extension toward Fort Pond Bay has been undertaken and is being pushed rapidly forward. Nearly all the bridge work has been completed and the construction material to build the road to Montauk Point is being delivered daily. It will be necessary to construct about 20 miles of road to reach Fort Pond Bay, N. Y.

Mobile, Jackson & Kansas City.—This project for a road out of Mobile northeast to a point near Jackson, Miss., which has been talked of for three years or more, again shows some signs of renewed activity. Messrs. H. H. Lane, of New York City, and R. F. Ezzell have recently been revising the old surveys of the line, and it is said that they represent certain northern interests which are likely to take up the project.

Montgomery, Hayneville & Camden.—Major John T. Milner, of Birmingham, Chief Engineer, is now making a new survey of this road between Montgomery, Hayne-

ville and Camden, Ala. This road has already been surveyed a number of times, and about 11 miles of the line out of Camden was graded over a year ago. The right of way has been secured from Camden into Montgomery, 75 miles, and the President announces that contracts for building the line will be awarded if the city of Montgomery will accept the proposition to subscribe for stock of the company to the amount of \$100,000.

Reynoldsville, Warren & Buffalo.—This company was incorporated in Pennsylvania last week. The road is to be 80 miles long and to extend through the following counties: Jefferson, Clearfield, Elk, Forest and Warren. It will connect the central portions of McAlmont township, Jefferson County, with the Dunkirk, Allegheny Valley & Pittsburgh road near Warren. Several of the incorporators are from Buffalo, N. Y. The capital stock is \$1,200,000. S. B. Elliott, of Reynoldsville, Pa., is President.

South Chicago Terminal.—Articles of incorporation were filed at Springfield, Ill., Aug. 24. It is proposed to construct a railroad from a point near the Calumet River, in Cook County, to run northwesterly to a junction with the Chicago & Western Indiana, Chicago, Rock Island & Pacific and Calumet & Blue Island roads. The capital stock of the proposed railroad is \$60,000. The incorporators and first Directors are J. C. Ames, Streator; J. J. Coleman, North Greenfield, Wis.; J. E. Page, M. L. Ash and Joseph Peake, all of Chicago.

Southern Pacific.—It is expected that the double track laying which has been for the past few months going on between Morgan City and New Iberia, La., will have been completed by Oct. 15, in time to move the sugar crops. The distance between these points is about 25 miles.

Tyler Southeastern.—Preparations are being made to change the gage of this road from 3 ft. to standard. It is operated as a division of the St. Louis Southwestern from a connection with the main line at Tyler, in Eastern Texas, south to Lufkin, a distance of about 80 miles. The roadbed has been widened, the new ties put in, and it is expected that the change of rails will be accomplished before Aug. 31.

Washburn, Bayfield & Iron River.—The preliminary survey was started last week for this road out of Washburn, Wis. The projectors assert that grading will be commenced by Oct. 1 and the road completed to Iron River by fall.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—Judge Caldwell entered a decree of foreclosure at Leavenworth, Kan., on Aug. 27.

A suit to collect \$2,000,000 was filed in the United States Court at Chicago, Aug. 24, by the Chicago Elevated Terminal Railway Co., against the above company. This action is supplementary to the intervening petition filed in the Federal Courts about two weeks ago. The attorneys for the plaintiff explained that the old charges of violation of contract were the basis of the demand for \$2,000,000.

Central of Georgia.—Judge Pardee of the United States Circuit Court, at Atlanta, has appointed three Commissioners to sell the property of the Central Railroad & Banking Co. of Georgia. They are S. A. E. Buck and Clarence Angier, of Atlanta, and George S. Owens, of Savannah. The date of sale was not fixed, but it will be about Oct. 1.

Chicago, Indianapolis & Chattanooga Southern.—A mortgage in favor of the Union Trust Co., of Indianapolis, for \$1,000,000 is being filed in the various counties in Southern Indiana through which this road is projected. The mortgage is made to secure funds to complete the road between Rockport on the Ohio River and Mitchell, Ind., between which points considerable grading has already been done.

Chicago, Peoria & St. Louis.—The reorganization plan, which bears date of Jan. 8, 1894, has been modified by the Reorganization Committee. The modification provides among other things for the issue of \$5,375,000 of new first mortgage 30-year four per cent. gold bonds, in lieu of the first mortgage bonds provided for in the old plan; and it provides also for the issue of \$4,220,000 of second mortgage 50-year income gold bonds, bearing four per cent. interest from July 1, 1895, if earned, in lieu of the second mortgage income bonds provided for in said plan, the latter bonds being subject to conversion into a permanent fixed charge at the rate of three per cent. per annum. It also changes the distribution of the new securities.

Lake Shore & Michigan Southern.—The following report for the quarter ended June 30 was issued this week:

	1895	1894	Inc. or Dec.
Gross earn	\$4,965,583	\$4,731,392	I. \$234,191
Oper. exp.	3,160,740	2,848,657	I. 252,083
Net earn	\$1,861,843	\$1,882,735	D. \$17,892
Other income	112,814	97,600	I. 20,214
Total income	\$1,977,657	\$1,975,335	I. \$2,322
Fixed charges	1,117,814	1,077,000	I. 20,214
Surplus	\$859,843	\$877,735	D. \$17,892
Cash on hand, \$847,921; profit and loss surplus, \$11,632,939.			
Six months ending June 30:			
Gross earn	\$9,663,994	\$9,396,328	I. \$267,666
Oper. exp.	6,087,278	5,865,086	I. 222,192
Net earn	\$3,576,716	\$3,531,242	I. \$45,474
Other income	205,614	189,933	I. 15,681
Total income	\$3,781,730	\$3,721,175	I. \$60,555
Fixed charges	2,230,014	2,199,933	I. 30,081
Surplus	\$1,551,716	\$1,521,242	I. \$30,474

New York, Lake Erie & Western.—The new plan of reorganization, which has been anticipated for some time, was this week made public by J. P. Morgan & Co. This plan takes the place of that issued by the same firm in January, 1894, and modified in December, 1894. The new plan is a pamphlet of 33 pages, and is accompanied by an explanatory circular of Morgan & Co., which is published in our advertising pages.

Under the present plan a new company will be formed, to own the through line from New York to Chicago. The voting trustees of the New York, Pennsylvania & Ohio will foreclose that property, and the control of the Chicago & Erie is understood to have been acquired by J. P. Morgan & Co., with the same object in view. The new company will thus be a compact organization instead of a disjointed system, which has been a chief cause of weakness in the old Erie company. The stockholders of the

present company are assessed \$12 a share on common stock and \$8 a share on preferred stock. If deposits are delayed beyond Sept. 30, the assessment will be increased 50 per cent. to \$18 a share on common and \$12 a share on preferred stock. The securities of the new company will be \$175,000,000 first consolidated mortgage bonds, divided in prior lien and general lien bonds, first preferred stock, \$30,000,000 second preferred stock, \$16,000,000, and \$100,000,000 common stock. Of the prior lien bonds, \$5,000,000 will be issued for improvements, new equipment, etc. A voting trust is created. It is understood that the plan has been accepted by large interests in this country and in Europe.

These are merely the general outlines of the scheme. The text of the pamphlet is full and there are many tables. It says that "the Erie system is made up of the lines known as the New York, Lake Erie & Western, the New York, Pennsylvania & Ohio, and Chicago & Erie roads. These two latter are operated by or for the Erie upon its guaranty that a fixed proportion of their gross earnings shall be paid as net earnings without regard to the actual results of the business. This arrangement is inherently weak, and develops a conflict of interests between three companies which ought to be close allies; and it also checks development and improvement. The permanent removal of these troubles is most desirable. In order to remove them, and to establish the community of interests above referred to, the plan proposes to consolidate, or otherwise unite, as therein set out, the three properties in one new corporation.

"An arrangement has been made with the New York, Pennsylvania & Ohio Railroad Voting Trustees, whereby, subject to ratification by their beneficiaries, they undertake to foreclose and deliver the N. Y., P. & O. property, subject only to the prior lien, equipment and leased line securities, for which reservation is made."

The new securities to be created on the entire line from New York to Chicago, with all branches, coal roads, etc. are as follows: (1) \$175,000,000 first consolidated mortgage 100-year gold bonds, secured by mortgage and pledge of all property acquired under the plan of reorganization by the new company. Of these bonds \$35,000,000 will be 4 per cent. prior lien bonds and \$140,000,000 will be 3 to 4 per cent. general lien bonds; (2) \$30,000,000 first preferred 4 per cent. non-cumulative stock; (3) \$16,000,000 second preferred 4 per cent. non-cumulative stock; (4) \$100,000,000 common stock.

The mileage of the new company will be:

New York, Lake Erie & Western proper.....	538 miles.
New York, Pennsylvania & Ohio.....	690
Chicago & Erie.....	25 1/2
New York, Lake Erie & Western auxiliary companies.....	550

1,938 miles.

It will have valuable terminal facilities at Jersey City, Weehawken, Buffalo, etc., and also one-fifth ownership in the stock of the Chicago & Western Indiana. Of the prior lien bonds, \$5,000,000 are reserved for enlargement and improvement of terminal facilities, including elevation of tracks, additional wharf facilities at New York, reducing grades, constructing double track and purchasing additional equipment. These bonds to be used only with the consent of the voting trustees. Of the general lien bonds, \$92,668,000 are reserved for the ultimate acquisition of all bonds and guaranteed stocks now left undisturbed in various parts of the system, and \$17,000,000 for new construction, betterments, additions, etc., after 1897, not over \$1,000,000 to be used in any one year. The reorganization converts into new securities everything on the Erie subsequent to the first consols, everything on the N. Y., P. & O. except \$8,000,000 4 1/2 per cent. bonds, and everything on the Chicago & Erie subsequent to the first mortgage.

The present Erie second consols get 75 per cent. in new general lien bonds and 55 per cent. in new first preferred stock; the funded coupon bonds of 1885 get 100 per cent. in new general lien bonds, 10 per cent. in new first preferred stock and 10 per cent. in new second preferred stock; Erie incomes get 40 per cent. in new general lien bonds and 60 per cent. in new first preferred stock; the present preferred stock, on paying assessment, gets 100 per cent. in new second preferred, and the present common stock, on paying assessment, gets 100 per cent. in new common stock. Nothing additional is given for the assessment in either case. Chicago & Erie incomes get 100 per cent. in new second preferred stock. The new general lien bonds are to bear interest from July 1, 1896, at 3 per cent. per annum for two years, and 4 per cent. thereafter. In addition to its lien on all the railroads now belonging to the Erie, the new mortgage will further be secured by lien on the N. Y., P. & O., the Chicago & Erie and other properties. The Erie reorganization first lien and collateral trust bonds will be paid off. All the stock will be put in a voting trust for five years. A syndicate of \$25,000,000 in money has been formed to subscribe for \$15,000,000 of the prior lien bonds of the new company, and to take the place and succeed to all the rights of holders of preferred and common stock of the New York, Lake Erie & Western who shall not deposit their stock and pay the assessments thereon. J. P. Morgan & Co. and J. S. Morgan & Co. charge \$500,000 for their services.

The plan goes on to say: "The fixed charges of the Erie system for 1894 amounted to about \$9,400,000; under this plan they will amount to about \$7,850,000, making a reduction of about \$1,550,000.

For the first two years after reorganization they will be further reduced by \$300,000 per annum, as the new general lien bonds will, during that period, bear only 3 per cent. per annum interest. The plan also provides for such moderate expenditures on capital account in the early future and for a long series of years as shall be necessary for the regular and steady development of the property. The absence of any such provision for capital expenditures has always been one of the chief sources of embarrassment of the Erie system, and has made it impossible for that system to keep up with its competitors, or to adapt itself to handling business with that economy which the character of its traffic renders essential. If satisfactory results are to be secured, the system traverses a territory which affords a relatively small proportion of non-competitive traffic, and a large part of the revenue comes from "through" freight and from coal and iron, on which low rates prevail at all times, and on which the rates are always among those most seriously affected in times of prolonged depression. This plan, in order that its benefits shall be permanent, seeks to enable the company successfully to meet these periods of depression when they come. With this in view, the fixed charge for the years ending June 30, 1897 and 1898, is reduced to about \$7,550,000 per annum, a sum nearly equalled by the net earnings of the property in 1893-4—one of the worst years the country has ever known, and one in which this property was operated under great disadvantages. Furthermore, in the new fixed charge is included the interest on a large sum of money intended to be spent

immediately after reorganization in improving and adding to the property, and in purchasing modern equipment. This expenditure should enable the company to enlarge its business, and also to transact it with greater economy than heretofore; circumstances which readily justify the slight increase of fixed charges after July 1st, 1898, as set forth above, to say nothing of the increased revenue likely to ensue from improved commercial conditions throughout the country. The net earnings this year will not differ materially from last year, if allowance is made for large amounts spent for building cars and other like work this year, which are treated as a part of operating expenses by the receivers.

The plan also shows that the real net earnings of the Erie System, from 1887 to 1894 inclusive, leave (after allowing for all cross-entries and worthless items) an average surplus over the new fixed charges of about \$1,500,000 per annum, a sum sufficient for the full 4 per cent. dividend on the first preferred stock and nearly 2 per cent. on the second preferred stock. The reorganizers call attention to this and say: "While not intending to imply that any return to former average earnings can be immediately realized, we make the foregoing statement to show that the securities of the new company will have intrinsic value, and that the reorganization is sound and conservative."

New York, Ontario & Western.—The statement of earnings for the year to June 30 was published this week and makes the following comparisons with the previous two years:

	1893.	1894.	1895.
Gross earnings.....	\$3,684,173	\$3,842,119	\$3,663,113
Op. expen. and taxes.....	2,798,255	2,732,540	2,642,412
Net earnings.....	885,918	1,109,579	1,020,700
Fixed charges.....	333,095	690,012	700,317
Surplus.....	256,892	419,566	320,382

The annual meeting of the Ontario & Western stockholders will be held Wednesday, Sept. 25.

Northern Pacific.—The Controller has issued a report, showing the result of operations for the year ended June 30. It shows gross earnings, \$17,434,930; operating expenses, \$11,319,682; and net earnings from operating expenses, \$6,115,299. After deducting all taxes and interest charges, a surplus of \$535,974 remains, and after deducting other payments made by the receivers, a net surplus of \$257,540 remains.

Oregon Railway & Navigation.—The plan for the reorganization of the property was made public last week by the General Reorganization Committee, which represents foreign and American security holders. The plan contemplates a new corporation which will issue \$24,500,000 4 per cent. 50 year bonds, to be a second mortgage on property covered by the present first mortgage, and a first mortgage on all the other property of the new company. The new bonds will be distributed as follows: \$12,583,000 at par to existing consolidated mortgage bonds, \$2,591,000 at 50 per cent. to \$5,182,000 existing collateral trust bonds, \$5,390,000 reserved to retire existing first mortgage bonds, \$1,106,000 reserved for betterments and terminals, and \$2,830,000 to be used for extensions at not more than \$20,000 per mile of road. The new company will issue \$11,000,000 4 per cent. non-cumulative preferred stock and \$24,000,000 common stock. The preferred stock will be distributed as follows: \$5,662,350 to consolidated mortgage bonds at the rate of 45 per cent.; \$3,627,400 to collateral trust bonds at 70 per cent.; \$1,440,000 to present common stock for the 6 per cent. assessment on \$24,000,000, and \$370,250 for reorganization expenses, etc. The common stock of the new company will be issued share for share to the present common stock on payment of 6 per cent. assessment. Under the proposed plan the fixed charges of the new company in the first year of its operation will approximate \$960,480, as against present fixed charges of \$1,305,250. The fixed charges of the new company will be reduced annually by about \$1,000 through the operation of the existing first mortgage sinking fund. Betterments, terminals, and settlements of claims will require \$1,250,000; expenses of reorganization and contingencies, \$435,425; interest, \$314,575; total cash requirements, \$2,000,000. This will be met by the 6 per cent. assessment on existing common stock (\$1,440,000) and \$560,000 which will be on hand from operation of the property.

Palmetto.—This road is to be sold at Hamlet, N. C., this Friday, in accordance with the decision of the United States courts in the Carolinas. The property includes 18 miles of road from Hamlet to Cheraw, S. C., and connects the Carolina Central and Cheraw & Darlington divisions of the Seaboard & Roanoke has been operated by the officers of the Seaboard & Roanoke, though an independent organization has been maintained.

Savannah & W. stern.—Holders of consolidated mortgage bonds have approved the plan for reorganization of the Central Railroad & Banking Co., of Georgia, more than 70 per cent. of the bonds being now deposited with the Borg Committee. Decrees will be taken in Atlanta immediately for the sale of the road.

South Brunswick.—The South Brunswick Terminal Railroad Co. has been reorganized under the name of the South Brunswick Railway Co. and a charter was granted the new company in Georgia last week. The road was sold at receiver's sale in August, and was bought in by Hiram H. Steele and John B. Keer, of New York. They have reorganized it and capitalized it for \$500,000. The road runs from Colonel's Island, in Glynn county, near Brunswick, to Waynesville, in Wayne county, Ga. It is said that several of the short roads in that vicinity will combine with the new road which will be extended so that it will connect with the Southern.

Southern.—The company has completed arrangements with the authorities of Norfolk, Va., for the lease of terminal property from the city. This secures the entrance of the road into Norfolk, which will become the deep-water terminus of the road.

Southern Central.—This road was sold under foreclosure of the first mortgage at Oswego, N. Y., on Aug. 23, under an order of the New York Supreme Court. The property was bid in by the Reorganization Committee of the stockholders for \$1,000,000. In pursuance of the plans of the Reorganization Committee, a new company called the Lehigh & New York has been organized and has assumed the operation of the property. The directors and officers of the new company are all connected with the Lehigh Valley road, which will continue to operate the line. The Southern Central is the Seneca Division of the Lehigh Valley, extending from Sayre, Pa., just below the New York State line to Lake Ontario, its lake terminus being at Fair Haven. The length of the line is 115 miles.

South Pennsylvania & Ohio.—The right of way, franchises and other property of this company were sold at Steubenville, O., last week to R. H. Cochran, of Toledo, a former President of the company, for \$12,000. He had secured a judgment for \$50,000 against the company and among the other judgment creditors was the Cleveland, Canton & Southern for \$146,000. This road

was projected by Mr. Cochran, who was President of the Wheeling Bridge & Terminal Co., while the terminal bridge at Wheeling was being built to construct a road from Wheeling to Cleveland. The company soon became involved in financial difficulties and very little work was done, Judge Cochran finally selling the right of way to the Cleveland, Canton & Southern when H. W. Blood was President of that company. It does not appear that the recent sale of the property is likely to result in any active work being done to complete the road.

St. Joseph & Grand Island.—Judge Sanborn, in the United States Circuit Court, at St. Paul, on application of the Central Trust Co. of New York for receivers for the road, this week appointed the Union Pacific Receivers as such receivers.

Stuttgart & Arkansas.—Judge Parker, of the Arkansas Supreme Court, at Little Rock, Ark., this week decided the application for a Receiver made before him some weeks ago by the Farmers' Loan & Trust Co., appointing S. W. Fordyce, of St. Louis, Receiver of the property. The Trust Company is the trustee of the first mortgage bonds, and brought this suit for a Receiver, alleging default in the payment of interest for a year or more past. The application was opposed by F. M. Gillette, of New York, President of the company. The road runs through a rich part of Arkansas from Stuttgart to the White River near Gillette, and is about 40 miles long. It was completed last year.

Texas Western.—The recent sale of this property at foreclosure at Houston, Tex., will come up for confirmation before Judge Bryant, of the Texas Supreme Court, on Sept. 2. The road was purchased at foreclosure sale by Elijah Smith, the President of the company and the principal owner of its securities, for \$30,500. It is understood that if the sale is confirmed the gage of the road, now 3 ft., will be changed to standard and important improvements undertaken. At present the company operates 55 miles of road extending west of Houston to Sealey, and was paralleled by the Houston extension of the Missouri, Kansas & Texas.

TRAFFIC.

Traffic Notes.

The Louisville & Nashville has arranged for a monthly steamship from Pensacola to Liverpool.

It is said that the Wisconsin & Michigan Car Service Association will not be reorganized, but that the roads will collect demurrage independently.

Lake traffic is improving, and at Chicago last week some boats got 1 1/2 cents a bushel on corn and 2 cents on wheat to Buffalo. These are the highest prices paid this year.

The steel canal boats from Cleveland, bound for New York, passed through Rome on Aug. 23. The water was low and the boats grounded several times. It is said that the average speed from Buffalo to Rome was only two miles an hour.

The New York, Lake Erie & Western has issued 1,000 mile tickets in accordance with the New York state law. They will not be transferable, must be presented at the ticket office and not on the train, and can be procured only by sending to the General Passenger Agent.

The Baltimore & Ohio has made a reduction of about 25 per cent. in 50-ride family tickets between the principal cities on the road and stations not far off. These tickets are in use in the regions of Baltimore, Washington, Philadelphia and Pittsburgh. On the Washington Branch 10-ride tickets will be sold at two cents a mile.

There seems to be the usual doubt and delay in completing the organization of the Southern railroads. The articles of agreement of the new "Southern Freight Association" are not yet signed by all of the roads, and it is said that the Nashville, Chattanooga & St. Louis and the Queen & Crescent are among those which have not signed. The signature of the Seaboard Air Line is said to have conditions attached to it. The choice of a Commissioner is the subject of much discussion. Mr. Stahlman will not be reappointed, and it is said that there is a strong sentiment in favor of Colonel H. S. Haines, Vice-President of the Plant System, for the position.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Aug. 24, amounted to 48,651 tons, against 48,338 tons during the preceding week, an increase of 313 tons. The proportions carried by each road were:

Roads.	WEEK TO AUG. 24.		WEEK TO AUG. 17.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	5,416	11.2	5,183	10.7
Wabash.....	3,816	7.8	5,377	10.9
Lake Shore & Mich. South.	6,138	12.7	5,233	10.8
Pitts., Ft. Wayne & Chic-go	5,945	12.3	4,613	9.5
Pitts., Cin., Chi. & St. Louis.	5,933	12.2	7,183	15.8
Baltimore & Ohio.....	3,225	6.7	2,476	5.1
Chicago & Grand Trunk.....	5,421	11.2	6,596	13.2
New York, Chic. & St. Louis	4,507	9.3	5,775	11.9
Chicago & Erie.....	4,539	10.0	4,501	9.3
C., C., C. & St. Louis.....	1,441	3.0	1,396	2.8
Total.....	48,651	100.0	48,338	100.0

The Georgia Boycott Decision.

Following is the main paragraph of the decision recently given by the Georgia Supreme Court in the case of the Seaboard Air-Line v. Western & Atlantic: "Where, upon a valuable consideration, a railway company contracted with a railroad company to 'interchange business, both through and local,' with the latter and its connecting lines, for a specified term of years, 'upon terms as favorable and as advantageous to said road and its connecting lines as those given to any other railroad entering' a designated city, the railway company was bound by the terms of this contract, not only as to freight shipped from or to points upon its own line, but also as to freights destined to or coming from points beyond the same; and, therefore, could not, so long as it pursued a different and more favorable course as to other railroads entering the city in question, lawfully do anything to deprive the railroad company with which it had contracted, and its connections, of the benefits of 'through rates and through proportions of rates and bills of lading founded thereupon' as to freights of the latter class.